

ORGANIZATION OF THE ACADEMIC YEAR

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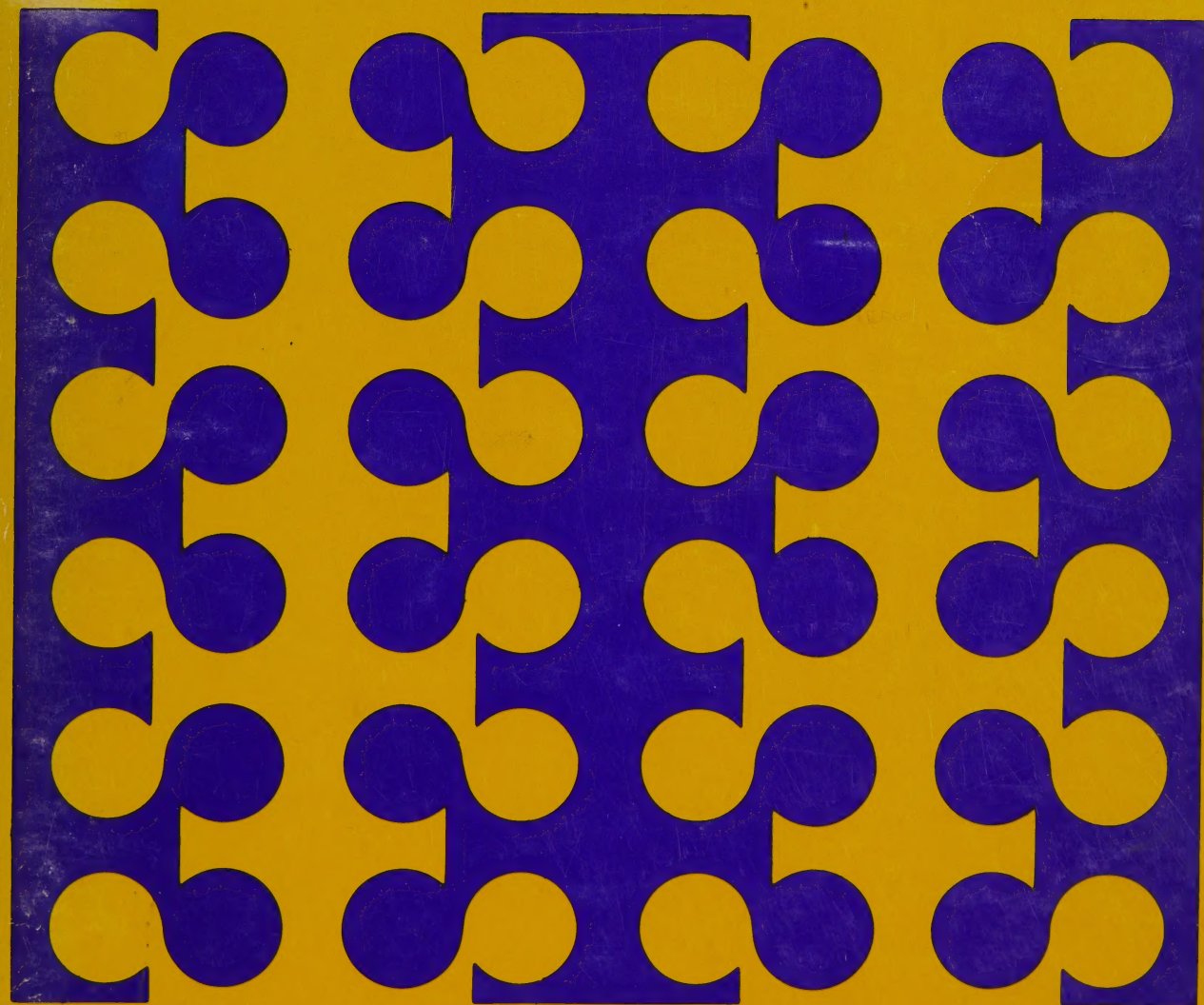
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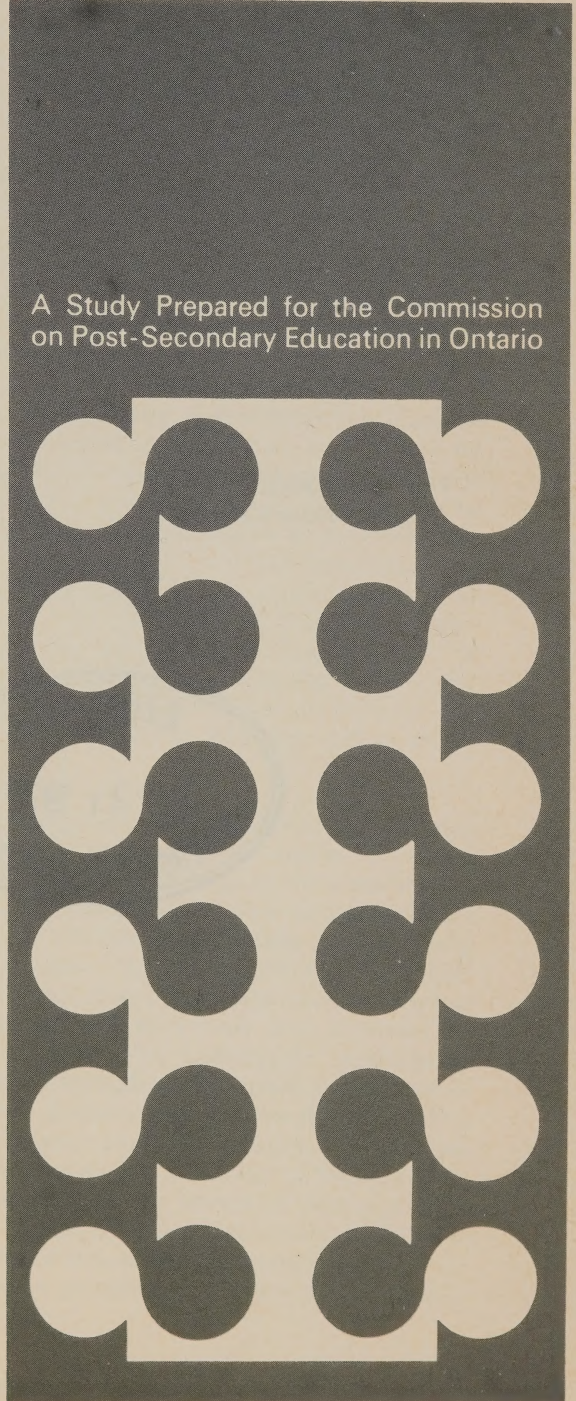
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ORGANIZATION OF THE ACADEMIC YEAR

A Study Prepared for the Commission
on Post-Secondary Education in Ontario



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Organization of the Academic Year

Editorial Foreword

The Commission on Post-Secondary Education in Ontario was required by its terms of reference to "consider, in the light of present provisions for university and other post-secondary education in Ontario, the pattern necessary to ensure the further effective development of post-secondary education in the Province during the period to 1980, and in general terms to 1990, and to make recommendations thereon." Among the particular matters the Commission was instructed to study and make recommendations on were "the type, nature and role of the institutions required to meet the educational needs of the province with particular reference to existing institutions and their ability to meet present and future demands" and "the costs, allocation of resources and the methods of financing for post-secondary education in Ontario as related to the attainment of equality of educational opportunity and as related to the resources of the province."

Considerations relating to the costs of operating post-secondary educational institutions, their accessibility to persons qualified to attend them, and the need for capital resources to be allocated to their construction, which are some of the major practical matters implied by these terms, have all in some measure become associated with the possibility of improving the performance of post-secondary educational institutions through year-round operation or other departures from what used to be considered the normal pattern for the academic year. The Commission acknowledged the relevance of this association in its first publication, *Post-Secondary Education in Ontario: A Statement of Issues*, where it asked: "Is there any justification for the 'academic year'? Do we still believe that students must go back to the farms to help with the harvest—hence the need for free summers? Why is the trimester the only alternative? Why not two six-month periods of schooling?" (page 20).

By the time the Commission began its work, a considerable amount of experience had accumulated with various kinds of year-round operating schemes for colleges and universities and with other approaches to the organization of the academic year that differed from our traditional ones. There had also accumulated a considerable body of literature describing these arrangements and, in some cases, recommending their advantages over the approach being used in Ontario. But there did not appear to have been any comprehensive survey of the range of such alternatives relevant to the situation in Ontario. Nor had any consistent work been done to model the consequences of adopting different schemes. The Commission consequently determined to fund a background study on this topic, one purpose of which was to describe the alternative ways in which the academic year and the time of students and others involved in post-secondary education could be organized. The study was also to examine the merit of these alternative models in the light of the experience with them in other jurisdictions, and to estimate the effects of these alternative patterns on operating and capital costs of post-secondary institutions if they were to be adopted in Ontario before the end of this decade. An important feature of this study was to be the use of quantitative modelling to estimate these operating and capital cost effects.

A contract to carry out such a study was awarded to Woods, Gordon and Company of Toronto to be conducted under the general direction of Mr. W. B. McMinn, Partner. Mr. McMinn and his associates brought a strong background of relevant experience to bear upon this particular project, the most recent and pertinent part of which was a study of the trimester system and proposals for year-round operation at Simon Fraser University in British Columbia. Their report was presented to the Commission in November 1971 and is now being published in the present volume. The Commission attaches much importance to this study not only because of its specific findings, which will make an important contribution to the public discussion of this topic in the future, but also because of the way it demonstrates the value of simulation techniques for planning and decision-making purposes in this field. The latter exercises have the further merit of indicating the kinds of information which policy-making and administrative bodies will have to have in future if they are to use such aids to rational decision-making in these fields.

The specific conclusions of the study are summarized in Chapter II along with a number of selected highlights. In the most general terms the study finds that the largest single academic benefit of year-round operation is the greater degree of choice that it provides for students in terms of curriculum and scheduling, but that this benefit is gained at considerable extra expense in operation. The modelling exercises show how difficult it would be to achieve offsetting economic gains which could justify such academic benefits. The authors reach the general conclusion, with respect to the present situation in Ontario, that there is no pressing need at this time to attempt to impose a full-scale move toward year-round academic calendar systems for our post-secondary institutions as a whole. At the same time they present a strongly substantiated case for developing an approach designed to test in greater depth the feasibility of an extended year plan (two semesters—ten months) for some representative universities and colleges, utilizing the simulation model developed in this study. One expected consequence of such further investigation anticipated by the authors of this study is that it would even more clearly display the poor economic justification for year-round operation until *other* measures have been taken which will improve the efficiency with which their facilities are utilized.

The opinions and conclusions contained in this study are solely those of the authors, and publication of the study does not necessarily mean that these opinions and conclusions are endorsed by the Commission.

ORGANIZATION OF THE ACADEMIC YEAR

A STUDY PREPARED

FOR

THE COMMISSION

ON

POST-SECONDARY EDUCATION IN ONTARIO

DECEMBER 1971

ACKNOWLEDGEMENT

This report has been prepared by Woods, Gordon & Co. Most of the background research and writing of this study and the development of the computer model were undertaken by the following members of the Firm:

W.B. McMinn,	Partner
G.S. Hamilton,	Principal
C.J. Christie,	Senior Consultant
D.J. Hipgrave,	Consultant

We wish to express our appreciation to those individuals who gave us their time for interviews and their names appear in Appendix B.

Also, we wish to thank members of the research staff of the Commission on Post Secondary Education for their assistance and co-operation.

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CHAPTER I - INTRODUCTION

A. Purpose and Objectives of the Study

As outlined in the original terms of reference provided by the Commission on Post-Secondary Education in Ontario, the project was to "study the Organization of the Academic Year". The main objectives of this study are summarized below:

1. To describe the options in the organization of the academic year, the allocation of students' and other people's time in post-secondary education (universities and colleges).
2. To examine the merit of these choices.
3. To estimate the effects of the various choices on operating and capital costs of post-secondary institutions.

Our research has taken into account the following considerations:

1. The experience of universities and colleges with year round operations including the following work:
 - a) The work of the "Committee on the Academic Year" at the University of Manitoba.
 - b) The "Tsetse" plan proposed by the McGill University Academic Policy Committee.
 - c) The nine-month academic year.

- d) The shift-work and other modifications in the traditional academic week and day:
 - i) The co-operative engineering program at Waterloo.
 - ii) Other plans involving industrial employment.
 - iii) Applicability of such schemes to arts and science programs.
 - iv) Proposals of Scrivener and Cornish to the Canadian Chamber of Commerce.
 - v) And others.
- 3. The academic implications of year round operations as reflected in the positions taken by university administrators, faculty and student organizations.
- 4. Quantitative modelling to determine the operating and capital cost effects of various calendars for year round operation.

B. Method of Study

During the past several weeks, a program of interviews has been conducted by our staff and associates of our Firm with senior personnel at over 25 universities, colleges and associations, both in the United States and Canada. We have interviewed about 75 people (listed in Appendix B), many of whom are regarded as authorities on the subjects of year round operations and co-operative education programs.

The interviews were undertaken by the following people:

William B. McMinn, Partner, Woods, Gordon & Co.
George Hamilton, Principal, Woods, Gordon & Co.
Dr. Gordon C. Shaw, Consultant, Woods, Gordon & Co. and
Associate Professor, Faculty of Administrative Studies,
York University.
Dr. John Chase, Office of the Academic Planner, Simon
Fraser University.

During the same period, we have collected and studied over 80 research studies, books and articles on the subjects of academic calendars, modes of operation, and simulation techniques and models for universities and colleges. We feel confident that we have collected all of the major studies and considered all of the meaningful research undertaken on these subjects in Canada and the United States over the past 12 years. A complete bibliography is included in this report as Appendix A.

We have attempted to interpret the conflicting positions taken by the various individuals interviewed and reports reviewed. Their viewpoints were often influenced by the local conditions (social, economic, political and personal) that prevailed at the decision-making moment. We have attempted to highlight the essentials of previous experience, and to minimize the issues which were raised but which, on some reflection, have not contributed significantly to the decision.

We have developed a simulation model to provide one method of financial and statistical analysis to assess the various options in year round operations. This modelling technique is an attempt to define a relative cost profile over a range of years for various calendar systems and to compare them to the conventional or two term operation (common to Canadian universities). A particular enrolment projection, a particular degree of plant utilization and, where applicable, particular levels of class sizes and summer enrolment were chosen for modelling purposes. These factors were then varied to determine the economic effects for various calendar choices. Cost relationships have been built into the model as determined from university aggregate cost figures (rather than from one particular institution), the purpose being to demonstrate the value of simulation techniques for planning and decision-making purposes. This model could be used by an individual university or college provided that the appropriate data was available.

CHAPTER II - HIGHLIGHTS AND CONCLUSIONS

A. Highlights

Several general highlights began to emerge after the reading and interviewing had been carried out, and considerable time had been spent in reflection and discussion of the many conflicting points of view.

The following chapters discuss, in much greater detail, these highlights and their associated benefits, costs, problems etc. This chapter is an attempt to summarize the main issues as concisely as possible.

1. Potential Improvement in Utilization

Proponents of year round operation emphasize the need to utilize better the educational facilities of building and equipment that are idled by the summer shut-down of undergraduate teaching. The potential improvement in utilization that can result from opening summer instruction is vastly over-rated for several reasons:

- a) The idle space is usually less than one-third of all space, (undergraduate lecture halls, seminar rooms and labs), the balance being academic offices, research space and administration space.
- b) The idle space is not expensive space.
- c) The utilization of such space is necessarily low even when classes are on a normal schedule.

The addition of a summer semester would in our opinion probably increase the overall station utilization from, say, a figure in the range of 50% of capacity on a 12 month basis to 55% of capacity on a 12 month basis.

2. Appeal of Year Round Operation to Avoid Capital Building

A summer semester has the distinct advantage that it can offer additional student places at moderate increase in operating costs (largely academic salaries) and negligible increase in capital costs. However, if the physical plant has "slack", then student places can be made available in the fall and spring terms at even lower incremental cost.

It appears that "slack" does exist in many universities and colleges, and where it does not, the institutions are looking for ways to create it, say by utilizing evenings or Saturdays for undergraduate instruction.

Clearly, the economic appeal of year round operation is highly dependent on current utilization of all facilities. This economic appeal will vary within an institution from faculty to faculty and from time to time, being quite low while the institute is in the emergent situation of low enrolments and quite high when land, buildings and equipment are fully loaded.

In our opinion, an institution will find no economic advantage in year round operation until that operation becomes the alternative to a capital building program, thus implying that the overall utilization is very high. Also, it implies that no slack can be created by other minor modifications to the schedule.

3. Tradition of Student Enrolment Patterns

Experience of many universities with year round operations has now made it abundantly clear that students, given their own free choice, will not register in summer semesters or quarters in sufficient numbers to justify mounting the full curriculum. Some success has been made through compulsory year round curriculum, co-operative systems, incentive schemes, etc. The basic pattern of very low summer enrolments has not changed, and until it has, the increased operating costs of year round operation are not justified alone by the arguments of increased plant utilization.

4. Year Round Teaching

Members of faculty do not have year round responsibility for undergraduate teaching, even in a year round system. Deans and Departmental Chairmen without teaching responsibilities do, however, often work year round. A balanced trimester system for example would mean that one-third of the total teaching faculty would be required for the summer semester. Also, recognizing that faculty salaries do represent the largest single item of university expenditure (operating or capital), then the incremental costs of the summer operation are largely due to academic staff costs and cannot be eliminated in any version of year round operation.

It would be impractical to suggest that teaching faculty should be expected to carry their present normal load for 12 months, so this added cost seems to be a permanent part of a year round system. Within this report we highly recommend a two semester - 10 month program which avoids most of the cost and problems while accomplishing most of the benefits.

Moreover if changes in the commitment to teaching can be brought about, it is conceivable that some post-secondary educators could be expected to teach for 10 months of the year, or perhaps undertake greater contact loads per week. Other academic activities imposed on the instructor, such as research, public service, or committee work could be reduced slightly to compensate.

5. Student Point of View

Students favour the flexibility of year round operation and the ability to "drop in - drop out" every semester. They do not, in large numbers, take advantage of the ability to accelerate. Only a small minority are actually aware of the different systems and they put forth no collective statements or reactions.

6. Faculty Point of View

Teaching members of faculty favour a year round arrangement as it allows them to take advantage of special research arrangements off-campus and during normal academic

terms at the institution they are visiting. This has only an indirect benefit for the student or institution. Deans and Department Heads do not endorse year round operations. They have serious administrative problems which are compounded by the rotating research semesters and the accompanying lack of continuity.

7. Administrators

As well as the Deans and Department Heads, university and college administrators find procedures greatly complicated by year round operation. Schedules are crammed with three or four registrations each year and there is little time left to review and plan for the future.

Their view that year round operation is very difficult to control and plan is true indeed. The difficulty is, however, as much due to the autonomy of various departments within schools, faculties, and institutes as it is to the year round system. Planning any complex system requires a very disciplined environment when it comes to definitions, deadlines and compatability among departments in the system. Although a certain amount of autonomy is necessary and desirable, we believe that good long range planning for universities is achievable.

8. General Public

Many public statements are recorded, most in favour of year round operation based on the increased

utilization potential. For the most part, these were not based on any in-depth study. Experience at Pittsburgh, Florida and California related similar public statements before they went on year round operation.

9. Summary

The benefits to the student, chiefly the flexibility of the curriculum offerings, are worth some additional costs. However, this has to be regarded as a cost of maximum student choice and it is yet to be proven that this choice is really of long-run benefit to the student or the institution.

The difficulties imposed on the Deans and Chairmen for the administrative elements of the academic departments are in our opinion greater than the personal benefits to the other members of faculty. There are conflicting arguments as to how quality would be affected by going to year round operation.

The serious increase in volumes and frequencies for the normal administrative aspects, together with reduction in available time, mean that additional costs will occur in the administrative offices with no direct benefit to those offices.

In summary, the largest single academic benefit is the greater curriculum choice and term choice for the student, at considerable extra cost, and it would take many

years to determine the value of that extra choice. Clearly then there must be considerable economic gain from year round operation to justify the cost of changing. We illustrate in later chapters that economic gain is very difficult to attain.

B. What It Means to Ontario

A review of the current situation within the province of Ontario on the availability of student places and the effective use of resources in the post-secondary education system indicates that there exists: first, a shortfall from projections in the numbers of full-time students enrolled in universities and colleges for 1971-72; second, the apparent under-utilization of the instructional space available within the province; and third, the need to examine the allocation of teaching resources between teaching, research and other academic activities. Although there might be exceptions, it is generally apparent that there is no pressing need at this time to impose a full scale move within the province to adopt a year round academic calendar system for a number of institutions. On verification of student demand a selected institution or institutions might offer some particular program.

The University of Guelph with its trimester program, certain other universities with summer sessions and some colleges of applied arts and technology with year

round calendars offer undergraduate students in Ontario the opportunities to accelerate and to be flexible with the use of their time. It would be unwise to proliferate summer programs because only a small percentage of the total student population desires summer courses.

Our simulation model shows us that for the representative situations simulated, the quarter system never shows an economic advantage over a conventional year system. For a trimester system only modest savings accrue over a 20 year simulation of operating and capital costs.

According to the models the conditions have to be optimum before even modest savings are accomplished, and it might well be argued that such optimum conditions cannot be accomplished. This is supported by the fact that Simon Fraser University had had greater unit costs (19%) as a result of a trimester system with an approximate full-time equivalent student enrolment of 2,400, 5,000 and 5,400 students per semester.

For example the model showed a modest cost saving of 2.4% over a 20 year period for the following set of conditions:

- a) The average section size for all classes must be at least at the same level as in the standard two term system, namely, 33, 24, 21, 20 for academic levels 1, 2, 3, 4 respectively.

- b) The physical plant must be presently coping with 75% or more of its potential student capacity under the standard two term plan without a major capital project.
- c) The total enrolment must be evenly balanced across the three terms in the ratio $33 \frac{1}{3} - 33 \frac{1}{3} - 33 \frac{1}{3}$.
- d) The operating schedule of the trimester system must be two terms on and one term off with each student attending in one of three overlapping streams.
- e) The level to level retention rates must be the same as for the standard two term system, namely, 1.00, .890, .801, .360. Retention is low in fourth year because many students graduate after three years.

Examining the various runs it becomes clear that "average section size" is the most dominant variable, illustrating the large contribution of academic salary costs to each system.

C. Develop a Basic Plan to Maximize Utilization and Student-Choice

The Ontario Department of Colleges and Universities should embark on a well-planned program to accomplish in better ways and at less cost, the basic benefits normally attributed to year round operation (i.e. maximum student choice and greater utilization of physical plant). This plan should be worked out in co-operation with the univer-

sities and colleges but the Department must take the initiative and provide direction, co-ordination and research support.

This basic conclusion requires that the following activities be carried out before a total plan or set of guidelines can be developed. The following activities should be carried out without delay and need not wait for the development of even a preliminary plan, except perhaps the announcement of an intent to establish standards and to embark on reform to maximize student choice and utilization. It must be recognized that these two objectives compete in some respects and the proper balance will be difficult to define.

1. Develop a Well-Defined Framework
for Extended Year Plan

The Department should undertake an in-depth study of the extended year plan (two semester - 10 month) as an alternative to the more common forms of year round operation.

2. Solicit Reaction for Development
of a Plan for Extended Year

After some original study by the Department, a well-defined version of the extended year plan, its administrative and academic merits, its costs, etc. should be prepared for study by the various colleges and universities. Dependent on a good definition of such a plan, the various institutions should be asked to submit briefs as to their reaction for a shift from the conventional year system.

3. Develop the Basic Standards for Utilization of Universities and Colleges

In order to provide targets for university and college utilization the Department must undertake, in co-operation with the institutions, to establish practical standards for all the key variables in the measurement of utilization. This will be a difficult task since the basic variables (student/staff ratios, minimum enrolment standards, room utilization, retention factors, faculty teaching loads, etc.) are not uniformly defined throughout the various institutions. It is one thing to define and measure these vital numbers for individual institutions; in fact many of the universities are doing so according to definitions that best fit their own campus. However, it is a much harder task to determine what these numbers "ought to be". There is much debate as to how the standards should vary between institutions, or between faculties within an institution. The problem of establishing practical standards in this regard is so large that it is our opinion that the Department must take the initiative, but the input will be the collective research and debate of the institutions.

4. Simulate Specific Cases for Long-Range Planning

In co-operation with specific institutions, the Department should select some representative universities and colleges for further simulation with the model. Using

the best available approximations for each key variable for each institution, this will more clearly display the poor economics of year round operation until other measures are taken to improve utilization. Of more importance at the moment, it will also demonstrate the effect of slight improvements in each variable on the overall economics of even the conventional system.

CHAPTER III - DEFINITIONS AND DESCRIPTIONS

A. Definition of Terms

The report includes a number of descriptive terms, which although familiar to most faculty members or administrators in the universities and colleges, may be foreign or unknown to individuals outside of the academic world. We define these terms below to assist the reader. Certain other terms such as semester and trimester are described in considerable detail in the following sections of this chapter.

Curriculum	A specific program of course offerings.
Course-Section	A division of a course into two or more units or classes each of which requires a separate instructor.
Repeat Course	A course offered in more than one term in an academic year.
Full-Time Student	A student taking five courses for two terms in an academic year each involving three hours of attendance per week.
Full-Time Equivalent Student	The total number of course registrations divided by five or six depending on the institution.
Sessional Lecturer	A part-time instructor contracted by a university to provide teaching services over one term.
Full-Time Equivalent Teaching Staff	The total salary paid to part-time staff divided by the average salary paid to full-time staff plus the number of full-time staff.

Student/Staff Ratio The ratio of the number of full-time students to the number of full-time teaching staff.

or

The ratio of the number of full-time equivalent students to the number of full-time equivalent teaching staff.

Department A sub-division of a faculty or school usually devoted to a single discipline.

B. Definition of Year Round Operation

From our research and interviews, we have reached the conclusion that there does not appear to be a great deal of agreement as to what constitutes a "year round" operation for a university or college. As a result, there is neither full accord on the number of schools operating year round nor on the specific types of calendar schedules which fall within the general classification of year round operations.^{1*} The lack of agreement centres around the amount of undergraduate summer activity that constitutes a summer semester rather than the normal summer school. This requires a clarification of both the number of weeks of session and the number of students in attendance.

However, it is generally agreed that in order for a college or university to be on a year round calendar it must be in session at least 40 weeks per year.² In addition, the program should permit the student who desires

*References may be found at the end of the chapter.

to do so to earn his baccalaureate degree in three rather than the usual four calendar years without requiring more than a normal full-time course load.³

If a university or college is on a year round operation, certain other conditions would be expected to prevail which might include the following:

1. A freshman may enter at the start of any term - whether it be a segment of a three or four term calendar.
2. Transfer students and returning students may enter at the beginning of any term.
3. As a general rule, both entering and continuing students may enrol, in any term, in courses which enable them to make a full term's progress towards their desired degree.
4. The year round operation also implies that the curriculum would be available often enough to allow reasonable selection of options and compulsory courses.
5. Student enrolment is 'roughly' the same in all terms.⁴
'Roughly' is intended to mean 30% to 100% of fall enrolment.

The optimum or ideal year round operation would be characterized by terms of equal length, equal curriculum, content and quality, approximately equal admissions standards

and approximately equal enrolments. This does not mean that each condition must be met in full to make a full year round calendar feasible. It does mean that the efficiency of year round operations will be enhanced to the degree that these optimum or ideal conditions are met.⁵

Year round operation of a university need not require year round attendance by the student nor year round teaching by individual faculty members. Year round operation is concerned with year round utilization of the plant and facilities but not necessarily of the students or faculty.

C. Description of Calendar Systems

The following are descriptions of the more common calendar systems used by universities and colleges in Canada and the United States. To assist the reader in understanding the different calendar modes, we have prepared a chart, EXHIBIT I, which illustrates graphically the nine most popular calendar systems in Canada and the United States.

1. The "Traditional" or "Linked" Year System

The "traditional year" calendar is the most common in Ontario. Under this system, the student registers in September for all courses. The courses last the full academic year of 26 or 32 weeks and conclude with exams in April. There is usually only one registration and one final exam spanning the two terms, and the course material is covered in two terms which are "linked".

Some courses are conducted over only one term or half-year, and occasionally some are repeated during the second term.

At many Canadian universities employing this traditional year system, a summer session of six or eight weeks is added and a small number of courses are offered (say 20% or less of fall offerings). These courses are intended primarily for school teachers and part-time students and usually have sufficiently high registrations to be self-supporting in that student fees cover direct costs (primarily teaching costs).

2. Semester Systems

The semester calendar is generally composed of two regular terms of about 15 weeks of classes each running from late September to early June, plus a summer session which is outside the regular academic pattern.⁶ This calendar form has been characteristic of American post-secondary education. According to a survey recently carried out by the Academic Calendar Committee of the American Association of Collegiate Registrars and Admissions Officers, approximately 70% of American colleges and universities follow this pattern.

The semester system requires enrolment and examination in each term or semester. The courses in each term are not repeated until the corresponding term in the

next academic year or session and two terms would normally constitute the work of an academic year.⁷

There are a number of variations in semester systems, and three of the more common types are described below. The extent of use of each of these systems in the United States is discussed in the first part of Chapter V.

a) Traditional Semester

The traditional semester system includes two terms each of about 15 weeks of classes (excluding registration, vacation, examinations). First term commences in late September, includes a two week Christmas break, and has a three week session in January (commonly known as the 'lame duck' session). After a one week break, the second session runs from the first of February to about the end of May. In addition, there would normally be a summer session for make-up courses.

The number of colleges and universities in the United States using this system has shown a considerable decline over the past few years. It is unpopular because of the short period of three weeks of classes remaining after the Christmas vacation period.

b) Early Semester

Under this system the first term begins in late August or early September and ends in December

before Christmas break. The second term of classes begins in January and ends in late April or early May. The advantage of this system is that it eliminates the first term's short session of classes after the Christmas vacation period. The employment possibilities of the students are reduced because the period of their availability in spring and summer is different to that of most other systems.

c) 4-1-4 Semester Plan

Several institutions are moving towards the 4-1-4 plan which begins with a four month term of classes beginning late in August or early in September and ending in December. After the Christmas break, three or four weeks is set aside as a short period during which students may undertake individual projects or make use of this time as a reading and self-study period. The second term begins about the first of February and continues through to the end of May or beginning of June.

3. The Trimester Plan

The trimester or three semester plan basically is a modification of the semester plan, in which the year round academic calendar is composed of three, 15 or 16

week terms. The summer term becomes an integral part of the total academic calendar.⁸ Each 15 week term includes classes and examinations, with the examinations being held during the last week of classes. The timing of terms generally follows this pattern:

First Semester - Labour Day to Christmas

Second Semester - January to late April

Third Semester - May to late August

In addition to the third semester, the institution may run a summer school program concurrently with the latter part of the summer semester for a period of five to 10 weeks.

Under the trimester system, there are three registrations and three sets of examinations in each academic year. Generally, the student has the opportunity to enrol in any of the terms and by attending eight consecutive terms, can complete a four year baccalaureate program in as little as two and two-thirds years.

In order to make up for the reduction in term length when compared to the semester system, some institutions have extended the length of class periods.

4. Quarter System

The quarter calendar is composed of three regular terms per year with about ten weeks per term of classes plus a week of examinations. The school year is about the same overall length as a semester system (typically

32 to 34 weeks including exams and registration) running from late September through to early June. The fourth quarter is generally a summer session period which may or may not be outside the regular program.⁹

Under this system there would normally be four registrations and four sets of exams, with each quarter being an integral unit.

The normal academic year's work usually supplies the curriculum of the three quarters starting in September in each year. Subjects may be taught over one, two or three quarters. In general, subjects are divided into units so that even if they are considered to require three quarters of study, there is an examination set for the work done in each unit or quarter.¹⁰

At some institutions all four terms are equivalent in every respect and students may accelerate by attending the fourth term if they wish. Generally, students would enrol in three or four major courses each quarter which is less than the normal course load of five under the trimester or semester systems.¹¹

5. Variations on Typical Year Systems

The types of calendars previously described are by no means complete or comprehensive and there are many institutions with calendars which vary from these more customary calendar patterns, which indicates the extent of

flexibility possible in setting up academic calendars which can act as an aid to carrying out educational aims.¹²

Most of the variations seem to be in the treatment of the summer terms which can include the following:

- a) Summer terms with a shorter duration than the normal terms under the quarter, trimester or semester systems. These terms can vary anywhere from five to 12 weeks in length.
- b) Another method is to split the summer term into two equal parts of, for example, five weeks each, six weeks each, or seven and one-half weeks each for a split summer term within a trimester system.

We have been told of some colleges in the United States that have discarded the traditional academic calendars. Instead of requiring all students to carry from four to six courses simultaneously over a long semester, the student is permitted to carry one course at a time for say, a period of three weeks. The student may decide to take two courses and complete each pair in a period of six weeks or take five courses at a time over a 15 week period which would be equivalent to a conventional semester. One such institution which has adopted this 'modular' calendar program is Mount Vernon College in Washington, D.C.¹³

6. Co-operative and Work-Study Programs

The co-operative education (work-study) program is the combination of work and study in a university or college educative program.

Under this system, students spend a portion of their time working in industry. Generally, a scheme is devised to divide students into two sections. One section of students attend classes while the other section of students are holding jobs in industry. After a specified period of time, the students in these two sections change places: those who had been attending classes take over jobs by those held in industry, and those who have been working come back to university or college to attend classes.¹⁴ As a result, at any given time there are approximately equal numbers of students on campus and in industry. As a result of this splitting or streaming of students, the university or college goes to a year round operation and generally repeats courses within the year. In most cases the calendar year is divided into periods of equal lengths (11 week quarters or 15 week semesters being most common) with a change from campus to industry or vice versa at the end of each unit of time.¹⁵ However, the length of time for alternating study and work terms can vary significantly from two weeks up to as much as a year, depending upon the policy of the university or college and the nature of the program involved.

In Chapter VIII, we discuss in considerable detail co-operative education.

Footnotes

- ¹ Ross, D. and DaSilva M.T. Year Round Operations, Preliminary Papers, The Council of Universities of Ontario, 1969 p. 2-4 to 2-5.
- ² Stickler, W.H. and Carothers, Milton M. The Year Round Calendar in Operation, Atlanta, Georgia: Southern Regional Education Board, Monograph No. 7, 1963 p. 5-6.
- ³ Ibid.
- ⁴ A Comparison of Trimester and Four Quarter Calendars for Year Round Operation of Public Higher Education in California, A Staff Report Prepared for the Coordinating Council for Higher Education, November 26, 1963.
- ⁵ Stickler, W.H. and Carothers, Milton M. op. cit. p. 5-6.
- ⁶ American Association of Collegiate Registrars and Admissions Officers. The University Calendar: Committee on the University Calendar, Washington, D.C., 1961 p. 8.
- ⁷ Wilson, H.D.B. Investigation of the Year Round System, Winnipeg, University of Manitoba, 1963 p. 5.
- ⁸ Stickler, W.H. and Carothers, Milton M. The Year Round Calendar in Operation, Atlanta, Georgia: Southern Regional Education Board, Monograph No. 7, 1963 p. 8.
- ⁹ American Association of Collegiate Registrars and Admissions Officers. The University Calendar: Committee on the University Calendar, Washington, D.C., 1961. p. 8-9.
- ¹⁰ Ross, D. and DaSilva, M.T. Year Round Operation, Preliminary Working Papers, Section 3, The Australian Experience, The Council of Universities of Ontario, 1969. p. 3-1 to 3-2.
- ¹¹ Webb, David C. Year Round Operation of Universities and Colleges, (Montreal) Canadian Foundation for Educational Development (1963) p. 30-31.
- ¹² American Association of Collegiate Registrars and Admissions Officers. The University Calendar: Committee on the University Calendar, Washington, D.C. 1961. p. 19.

- ¹³ Meniffee, Audrey. Liberating the Academic Calendar,
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- ¹⁴ Wilson, James W. and Lyons, Edward H. Work-Study
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- ¹⁵ Wright, D.T. The First Five Years of the Co-operative
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CHAPTER IV - OUR INTERPRETATION OF THE POSITIONS TAKEN BY PERSONS INTERVIEWED AND OTHERS INVOLVED

This chapter attempts to document in total, the opinions we have heard or read about during the survey. We have tried to highlight the more important issues as stated for us but we have not attempted to measure the significance of these arguments. Nor do we necessarily agree with some of the concerns voiced by individuals or groups who are in a position only to speculate on these matters.

A. Students

We summarize what we believe to be the effects of year round operations on students, both favourable and unfavourable. As a result of our interviews and a review of the research done by others, we consider the attitudes of students towards year round operations. The attitudes and effect on students of co-operative or work-study programs is in a separate chapter of this report. In some issues the disadvantages discussed are merely qualifications of the advantage in order to put a potential benefit, such as acceleration, into a practical case.

1. Factors Favourable to a Year Round Operation

a) Acceleration of Student Program

A trimester or quarter system generally provides students with a great deal of flexibility in that

they may accelerate, decelerate or proceed at the normal pace found in a traditional year or two semester system. With extreme acceleration a student can earn a four year baccalaureate degree over a calendar period of less than three years.

b) The Student's Finances

Using reasonable assumptions, it can be shown that the student is better off financially by the age of 21 or 22 if he borrows the money and completes his degree in three years and has one year at full salary afterwards, rather than taking four years with three summer work periods. It is reasonable to assume that for the rest of his life the student would have an extra year's experience after graduation, with a consequently higher salary.

c) Individual Programs

The trimester or quarter systems should allow the student to take a missed subject in the next semester rather than taking a whole year to make up failures. In addition, if a student is forced to miss a portion of the academic calendar because of illness or financial reasons, he may enrol in the following semester or quarter rather than waiting for several months for the next September enrolment date. Also he can change his course

selection more easily if a certain curriculum choice becomes uninteresting.

d) Student Off-Campus Life

Life for the student is no longer tied to the seasons since central heating and air conditioning allow for studies to be carried on under comfortable conditions at all times. Regions characterized by favourable climatic conditions are available for recreation or visiting at any time of the year, and temporary employment opportunities for students are likewise available throughout the year.

Staggering the vacation period for students could help in reducing the demand for summer jobs and help alleviate the growing student unemployment problem. In summary, time away from the university and from the educational process is still desirable. This need not be during the summer months.¹*

e) Campus Facilities

There would be a more even use of campus facilities. Library and study facilities may not be as crowded and students could avoid the year-end scramble for books.² Also, residence and dining facilities would have more even use, thereby reducing overcrowding.

*References may be found at the end of the chapter.

f) Graduate Employment Opportunities

A staggered graduation would help to overcome the surplus of graduates on the job market in April and May. An even release of graduates should give them a better chance at employment.³ However, there is the potential problem that the graduates may not be acceptable to many employers who are conditioned to annual spring hirings.

g) Availability of Graduate and Professional Courses

For the student and his family, the period of higher education required to prepare for professional and many other occupations is intolerably long.⁴ For the individual, the social and economic consequences are often severe, involving delays in marriage, earning capacity and progress towards personal independence.⁵ Since the trend is towards more students going on for specialized and professional training after their bachelor's degree and thus extending their number of years spent on higher education, the possibility of acceleration takes on added significance.

Acceleration could serve to encourage more students to go on to professional study since they would be able to finish sooner and possibly at a lower cost.

A side benefit is that acceleration would provide society with more trained people at an earlier age. For example, many Canadian universities have recognized the need to accelerate programs for medical students. This need for acceleration to meet Canada's rising requirement for physicians is discussed in the 1970 Task Force Report on the cost of health services in Canada which recommends that undergraduate training facilities for medical students be operated on a year round basis.

2. Factors Unfavourable to a Year Round Operation

a) Pressure and Fatigue from Acceleration

No figures are available on the numbers of students that take advantage of the ability to accelerate. We are led to the conclusion that students in full time attendance during the summer are not usually accelerating but merely switching their vacation semester from summer to autumn. There is much support for the suggestion that students, for reasons of fatigue and immaturity, should not attend full time 12 months per year until graduation. There is concern that the student either cannot or will not accept the pressures of attending either university or college on a year round basis. If the student takes up the opportunity to accelerate,

he must perform almost continuously for eleven months per year and fatigue is a possible consequence. Further pressures are put on the student because of the compression of course material into a shorter period of time. However, a year round program should generally offer the student more flexibility and provide him with more latitude for independent decision on the load he wishes to carry. At this time, we have the experience of many graduate students and undergraduate students in medical courses studying year round without any apparent ill effects. Also, during and after World War II, many veterans attended university on a year round basis for a continuous period of two or more years with no bad effects.

b) The Students' Finances

Year round attendance for many students may cause personal financial problems. If the student wishes to accelerate, the year round calendar will necessitate more concentrated spending over a shorter time span. Students could make more use of student loan plans to borrow money and stay in college or university for longer stretches of time. However, many students are reluctant to incur

substantial debts during the university or college years, especially if they anticipate difficulties in obtaining employment upon graduation.

c) Shorter Curriculum Duration

A transition from a traditional year or semester system to a trimester or quarter system generally requires the compression of course material into a shorter period of time. A student at the University of Guelph submitted a brief to the Commission in which he stated that under the trimester system the term courses cover anywhere from two-thirds to three-quarters of the material covered in a comparable academic year course at other universities. He stated that this probably results largely from the fact that many professors are the products of universities on the 'traditional year' system and that they simply haven't adapted to the shorter period of the semester. This point of view is widely held and we support the contention that the student is expected to cope with essays, seminar papers, mid-term and final exams, and a large amount of reading all within a shorter period of time. As a result, there is an increased workload for the student.⁶

The compression of courses into a shorter time span may reduce their effectiveness since students would have less time to assimilate material, and the quality of the educational experience. Because of this compression of courses and curriculum, students may reduce their course loads and take five years for a four year program. Although this deceleration would not increase staffing or classroom costs, it would increase the number of students using the physical facilities and offset in part savings that might materialize from year round operations.

d) Reduced Curriculum Choice

Our investigations indicate that there has been a reluctance on the part of students to attend the summer terms where they are made available by colleges and universities. Consequently, enrolments in the summer term or quarter have been substantially below the enrolments in fall and winter. Because of low summer enrolments, the number of courses offered has been reduced in the summer term resulting in a reduced selection of courses made available to the students. Some students may have to wait for a period of 12 to 18 months to take specific courses which they want to include in their program.

e) Tradition of Calendar Pattern

The calendar pattern of a four month summer break has been the tradition in Canada for many years. To change it would take many years and would require gradual adjustment from every aspect of society that influences it or is influenced by the higher educational system. In addition to the students themselves, and the universities and colleges, new attitudes would be required by parents, high school systems, employers, urban services etc.

Much of the literature on the subject of year round operations refers to the importance of a long summer vacation as an essential part of a student's maturation process. In year round operation, if the student requires a holiday or the time to work and earn funds for the next term or sequence of terms, there is nothing to prevent the student from taking a term or series of terms away from school. Certain students claim that employers are not willing to have temporary employees during the fall and winter periods and that therefore only the spring and summer period are satisfactory as income-earning semesters.

f) Students' Extra-Curricular Life

Year round operation breaks up the division of students by years. Some writers suggest the consequences

are to increase the student's feelings of loneliness, anonymity and insecurity within the university.⁷ This point raises the whole question about student participation in extra-curricular activities such as clubs, social events and athletics. The general consensus seems to be that there is a lack of continuity within the student body with trimester or quarter systems. The whole body of students is not together for the total academic year with students enrolling and leaving in individual terms and quarters. Also, some students have stated that with the compression of courses necessitated by the shorter term lengths, the pressure of their studies provides little time for involvement in outside activities.

g) Transfers Between Institutions

There is the problem of articulating transfers between high school and college and university, and between one senior institution and another. When different institutions have different calendars, the starting dates may not articulate and time lapses may ensue. This becomes a particularly important problem when an institution is trying to equalize admissions and enrolments from term to term.⁸

B. Positions Taken by the Faculty

Generally, academics have strong feelings on both sides of the issue. For the most part, academics with primary interest in teaching and research favour a form of year round operation because of the flexibility offered for research semesters. (It is assumed that teaching responsibilities extend only for two of three semesters, or three of four quarters; i.e. a one semester off-campus research semester is traditional). Academics with departmental administrative responsibilities (deans, chairmen etc.), high level committee work, or heavy graduate research supervision, show disfavour for both trimester and quarter systems. Such systems are a great deal more complicated to plan and administer and problems are compounded by a lack of continuity.

In addition to these two large groups, there are some exceptions who are influenced by personal interests about income or legitimate long-term concerns about the concept of the research semester lasting in a year round system.

1. Unfavourable

a) Time for Research

Year round operation usually implies that members of faculty can take one semester or one quarter for off-campus research. However, this is impossible

for several key members of the academic staff, and in that case the year round operation has an adverse effect.

The final report of the Committee on Year-Round Operation of Universities of the Canadian Association of University Teachers, indicated real concerns about the effects of year round operations on their time. In particular they emphasize the importance of preserving the faculty member's free time for independent research, reading, preparation of new courses, bringing old ones up to date, and catching up with what is new in their specific discipline and in other activities essential to their survival as scholars and teachers. In their report, they stated that "It cannot be said too strongly that any system that deprives faculty by any means of a sizeable period of unscheduled time within each year will defeat the purpose for which it was conceived". In addition, they felt that many able faculty members had been attracted to university work, and have taken it on in preference to much more remunerative jobs which were open to them, just because it has offered faculty some free time each year for independent study. They felt that the long period of unscheduled time is of particular

importance to Canadian universities and enable these institutions to better compete for faculty members with universities and colleges in the United States.⁹

b) Tradition of Calendar Pattern

Faculty members are used to the traditional summer period for research, travel and vacation. In Canada, the vacation period has traditionally taken place during the summer months. Teaching commitments during the full summer period could be disruptive to those faculty members with young families attending primary and high schools.

c) Additional Income Potential

Many faculty members will teach in the summer school sessions in order to earn additional income. If the faculty member were required to teach the summer term as part of the regular academic year, he would then lose this opportunity for extra earnings. However, this argument suggests that it is not too much for a faculty member to teach in the summer as well as during the school year. In fact, the faculty member may have more opportunity to add to his income from extra teaching under the year round system.¹⁰

d) Fatigue of Academic Administrators

There are intellectual and physical drains on the faculty and staff because of the continuous operation of a university or college; this applies particularly at the dean and chairman levels. These drains on staff are compounded because of the limited time between semesters or quarters available for housekeeping chores.

e) Lack of Continuity

The year round operation such as the trimester system is characterized by a lack of continuity in university and faculty committees. This is due to the fact that nearly one-third of the teaching staff are on research semesters and are usually off campus.

Faculty on research semesters and students withdrawing from and re-entering the university create extreme difficulty in maintaining that continuity of membership that is so important to the smooth working and accomplishment of a committee dealing with a substantive problem. This lack of continuity also creates problems in the administration and interpretation of academic policies. This results from the university policy of having acting chairmen replace those chairmen who are on research semester.

f) Year Round Teachers

Much of the literature that we reviewed, indicates that many of the faculty (especially younger members) welcome the opportunity to earn additional income provided by the year round operation. Consequently, they become year round teachers and fail to devote the necessary time to reading, research and reflection which it is felt is necessary to the qualitative aspects of university teaching.

g) Younger Staff

There is the concern that the summer terms would attract a predominance of younger and less experienced sessional lecturers which could result in inferior instruction during the summer terms.

h) Greater Staff Requirement

It is generally agreed that the introduction of a trimester or quarter system would mean the addition of extra faculty and the resultant requirement for more office space and research facilities on campus. Therefore, moving to a year round operation for any university or college would require the additional capital expenditure for more physical facilities to accommodate extra faculty members.

i) Restructuring of Curriculum

If a university or college revises its calendar system, significant changes must be made to the curriculum

in order to fit the changes to a new time frame. For example, the majority of courses offered at Ontario universities are linked, meaning that the courses extend through the fall and winter terms. A conversion to a semester, trimester, or quarter system would require the restructuring of curriculum, which of course would be a major undertaking for all faculty members and possibly quite disruptive.

2. Favourable

For the faculty member, there are several advantages to year round operation which are considered below.

a) Time for Research

The basic teaching pattern under the trimester and quarter systems provides faculty with considerable flexibility in arranging the work during research semesters. Often the faculty member can arrange it so that his research semester is during the traditional academic year thus enabling him to gain access to other academics at their institutions or find non-university research centres (traditionally crowded during the summer) not as busy.

Also, he can arrange it so that he teaches three or possibly even four semesters in succession and thus have two research semesters free in succession,

permitting extensive travel and long periods for research, writing and outside consulting.

b) Additional Income Potential

Faculty members may welcome the additional opportunities provided by year round operation to earn extra income. A concern of faculty members would be for adequate and equitable remuneration for teaching extra semesters or quarters. There is the concern that some institutions pay less for the summer session than for other terms even though all terms are the same length.

At Pittsburgh, faculty salaries were increased 33% for teaching a third term. An argument for this is that a third more time is spent annually in teaching. Some faculty members have reported that they should receive 50% again of their two term pay, since in the third semester the same amount of work is covered as in the previous semester and the same teaching hours are spent in classes."

c) Curriculum Review

The restructuring of curriculum and courses to fit within the shorter time span of semester and quarter terms would force faculty members to re-examine their courses and thereby improve upon the course content.

d) Potential for Visiting Academic Staff

The implementation of a trimester or quarter system in a number of universities would likely encourage the movement of faculty members between universities in order to fulfil sessional teaching assignments. This movement of faculty would provide for experience of working on several campuses.

C. Positions Taken by Administrators of Universities and Colleges

Year round operations require year round administration. The absence of that slack time found in the summer of the traditional academic year means that there is little opportunity to think, reflect and plan activities for the following year.

Members of the university administration are affected to varying degrees by a move to a year round operation.

1. Registrar

For the registrar's operation, the workload is at least tripled since there are three or four registrations and three or four sets of marks and evaluations.

2. Plant Maintenance

The plant maintenance department has the problem of maintaining sufficient personnel and materials to sustain an organization which is in continuous operation. There may

be insufficient maintenance and rehabilitation time. In particular, it may be difficult to carry out the major rehabilitation projects during the short summer and Christmas vacation periods.

3. Bursar

Business operations are intensified and more extensive; student personnel workers have more to do; housing and dining services have more customers and a longer work year.

4. Timetabling

There could be potential administrative problems in providing, at the same time, programs for accelerated students and those progressing at the normal rate. Also, more effort would be required in the scheduling and planning of summer terms if they were running along with the normal summer school sessions for teachers, adult students and undergraduate students on supplementary or makeup programs.

Also, as year round operation progresses, individual timetabling eventually takes precedence over group timetabling, and timetable conflicts soon appear. This forces very sophisticated procedures for construction of master timetables to minimize conflicts. Eventually, as individual timetabling becomes the norm, some restrictions on curriculum choice become necessary to stay within the reasonable utilization targets that made year round operation attractive in the first place.

5. Facilities Planning

In spite of the additional workloads created by year round operations for administration and support services, there is the potential advantage of improved utilization. For example, a year round operation would provide for the more efficient use of residences, especially if the enrolments in each term or quarter were balanced. We have been told that many universities are experiencing problems at this time in meeting fixed costs such as mortgage payments, with the residences half empty for four months of the year. In addition, it would likely be easier for the administration to staff housekeeping services and eating facilities with full-time people instead of having to schedule for the slow period during the summer with a smaller staff.

6. Availability of Staff to Mount Year Round Operation

It is often claimed that any large scale introduction of year round operations at universities and colleges in the province of Ontario would produce a major problem for the institutions in obtaining additional staff. Some people suggest that good university faculty members are already in short supply and this situation would be aggravated by the introduction of year round operations.

It is not the intention of this report to determine whether faculty are in short supply or over supply.

Our experience leads us to feel that year round operations should not be implemented overnight but only after a careful program is worked out. In such a program, the teacher resource becomes clearly identified as does the curriculum demand. Thus a reasonable reassignment of teacher loads can in all likelihood reduce the additional teacher requirement to a minor problem. Alternatives that might be considered, and likely in combination, to meet this additional requirement are:

- a) The use of full-time faculty teaching the additional terms for extra stipends.
- b) Sessional lecturers visiting from institutions in other jurisdictions can supply the need that occurs in the summer semester.

For say, a trimester system and the maintenance of a balanced calendar, an approximately equal number of faculty members would have to be on hand for each of the three terms. To the extent that faculty preference did not divide the group into approximate thirds, it would be necessary to ask members of the faculty to accept certain assignments at times not most convenient for them. In order to meet the need of giving faculty the necessary free time, a scheduling system might have to be devised. A difficulty lies in the fact that year round operation tends to give great emphasis to the expression of student demand

for courses, and the faculty schedule must be adjusted accordingly.

7. Academic Departments

The administrative aspects, both planning and operations, of all academic departments are greatly complicated because there are many more items to take into account (course offerings, enrolments, grading, reporting, counselling). These considerations would occur three or four times per year and yet, without the summer break for planning, they have even less time to organize the necessary activities. Without a well-developed systems approach, the administration of a year round operation becomes very hectic.

D. Public and Political Attitudes

There have been numerous public utterances by business, academic and political leaders about the all-year operation of universities and colleges. Generally, the resulting press reports have favoured year round operation although its form is usually not well-defined. In most cases, the suggestion to switch to year round operation seems based on the misconception that the biggest single factor, contributing to the low (by industrial standards) overall university utilization, is the summer shut-down of undergraduate instruction. This shut-down is not as great as it appears and other factors that are present

even during fall and spring do significantly cause the low utilization. This is discussed in greater detail in Chapters II and VI. Other arguments suggest that an all-year university operation would help students complete their education and become financially self-sufficient at an earlier age. There are many different opinions as to the importance of this potential.

Mr. A.C. Scrivener, the President of the Bell Telephone Company of Canada, recommended in June, 1970 to the Canadian Chamber of Commerce that they give leadership to a review of university operations. In particular, Mr. Scrivener proposed that the universities operate two six-month terms each year and that work-study programs be expanded. In this way, he felt that better utilization of the university facilities would be achieved and that students could more easily earn their way through university by alternately working and studying in these six-month terms. Employers could establish permanent "student job" positions to be filled by two such students each year and a closer integration would result. This plan would help students decide upon their future careers and would prevent "students being educated in a vacuum as far as practical contact with the world is concerned".

The Honourable William Davis, then Minister of Education for Ontario, spoke in Thunder Bay in February,

1971 indicating that he looked favourably on proposals for lengthening the university year to permit honours students to get their degrees in three instead of four years. The Globe and Mail, in their editorial of February 3, 1971, commented favourably on Mr. Davis's remarks. They continued by saying that Ontario's grants to universities for both operating and construction had increased to \$495 million in the current fiscal year from \$154.5 million in 1965-66 and that "we can't stand another five years of high budget increases". The Globe and Mail continued their support for the "12-month university year" in a later editorial (written after Mr. Davis became Premier) pointing out that Prime Minister Trudeau and the Secretary of State, Gerard Pelletier, appeared to favour extension of the university year. This second editorial brought an immediate response from Professor Trevor Lloyd of the Department of History, University of Toronto, who pointed out in a letter to the editor the difficulties inherent in expecting university students to study all year. Those included: encouraging the student to attend all year (Lloyd felt that most wanted the summer off); financing the student for 12 months of the year; and the problem of increasing the academic failure rate due to increased pressure on the student. Lloyd stressed that the operation of summer classes would require additional faculty and money would

be wasted if the universities were offering classes all year while there were not enough students to make the class sizes economic.

More recent press coverage reveals the continued concern, especially by the Globe and Mail, about the need for greater efficiencies in university teaching. As compared to the press stories of 10 years ago, when greater efficiencies were urged as a means of providing enough staff and facilities to meet the mounting demand for university education, the latest press items of November 10 and 11, 1971 urged greater efficiencies because of the observed decline in some 1971 university registrations. These editorials did not propose year round operation of the universities; they recommended the practice of citizens not necessarily completing their education in their teens and twenties, but returning to universities for further training at various stages throughout their lives.

Other recent press stories are beginning, however, to stress the negative aspects of all year operation. An objection, voiced by Dr. W.A. Winegard, President of the University of Guelph, was reported in the Globe and Mail of November 10th, 1971. Dr. Winegard said that "a number of (Guelph) students are dropping out during the fifth semester (the first of the regular third academic year) while others are requiring psychological assistance".

While these phenomena are not uncommon under any university system, one presumes that the numbers so affected at Guelph are great enough to concern its President. Dr. Winegard is also quoted by the Globe and Mail of last April as stating "If we are going to operate the university as a business and maximize savings, students will have to be in attendance for the full year with no options". He continued "Unless we reduce the university to a baby-sitting agency by lowering our work load we may create a lot more work for psychiatrists and psychologists".

Again in the aforementioned November 10th article, Dr. Winegard went on to say that a new double-summer semester program (day and night courses) may deplete the number of students in the three-semester program "further". "Students can accelerate faster in the split-summer program." Further criticism of the trimester system was levied by Dr. J.F. Leddy, President of the University of Windsor, in a recent speech at Iona College in Windsor. He said that the system has not worked in the United States and that most of the universities there are getting away from it because it is less economical than the semester system. Dr. Leddy said that the University of Windsor had found an answer to the trimester system in the intersession (May-June) and the summer session (July-August) programs. He claims that these two summer schools, combined with the night extension

program, provide the most economical answer to the criticism that the university is unused much of the time.

Footnotes

- ¹ Ross, D. and DaSilva, M.T. Year-Round Operations, Preliminary Working Paper, Section 2, Advantages, Disadvantages and Characteristics of Calendar Alternatives-The American Experience, The Council of Universities of Ontario, 1969. p. 2-2.
- ² Ross, D. and DaSilva, M.T. Year-Round Operation, Preliminary Working Paper, Section 3, The Australian Experience, The Council of Universities of Ontario, 1969. p. 3-2.
- ³ Ibid.
- ⁴ Hungate, Thad L. and McGrath, Earl J. A New Trimester Three-Year Degree Program (New York) Bureau of Publications, Teachers College. Columbia University for Institute of Higher Education. (1963) p. 4.
- ⁵ Ibid.
- ⁶ Bowles, John. A Brief to the Commission on Post-Secondary Education in Ontario: "Reflections of an Undergraduate", (Author is a student at the University of Guelph), 1970. p. 4-6.
- ⁷ Canadian Association of University Teachers. Committee on Year-Round Operation of Universities, Final Report. (In the C.A.U.T. Bulletin, Vol. 13, Special Issue, September 1964). p. 20.
- ⁸ Stickler, W.H. and Carathers, Milton M. The Year-Round Calendar in Operation, Atlanta, Georgia: Southern Regional Education Board, Monograph No. 7, 1963. p. 15-18.
- ⁹ Canadian Association of University Teachers. Committee on Year-Round Operation of Universities; Final Report, (In the C.A.U.T. Bulletin, Vol. 13, Special Issue, September 1964). p. 18.
- ¹⁰ Nelson Associates. Increasing College Capacity by Calendar Revision, A Report to the State University, New York: Institutional Research Study, State University of New York, 1961. p. 49-51.
- ¹¹ Clark, Margot. The Trimester System; Panacea or Trimonster? Montreal: McGill Reporter, Vol. 2. Number 10. November 21, 1969. p. 5.

CHAPTER V - SUMMARY OF OUR FINDINGS ON
THE EXPERIENCE OF OTHERS

A. General Trends in Calendar Systems Used

In Chapter III, we have described in some detail the more common calendar systems being used in Canada and the United States.

A recent survey was made by the Academic Calendar Committee of the American Association of Collegiate Registrars and Admissions Officers indicating the trends in the types of calendar systems used by American universities and colleges. The results of this survey are shown in the table below.

SUMMARY OF CALENDAR METHODS FOR THREE YEARS

<u>Semester</u>	<u>Prior to 1970-1971</u>		<u>1970-1971</u>		<u>1971-1972</u>	
	<u>Number</u>	<u>Percentage of Total</u>	<u>Number</u>	<u>Percentage of Total</u>	<u>Number</u>	<u>Percentage of Total</u>
Traditional	1,753	73.7%	850	35.7%	602	25.3%
Early	83	3.5	657	27.6	828	34.8
4-1-4 Plan	8	.3	180	7.6	230	9.7
	<u>1,844</u>	<u>77.5</u>	<u>1,687</u>	<u>70.9</u>	<u>1,660</u>	<u>69.8</u>
Trimester	81	3.4	72	3.0	76	3.2
Quarter	411	17.3	521	21.9	524	22.0
Other	<u>42</u>	<u>1.8</u>	<u>98</u>	<u>4.2</u>	<u>118</u>	<u>5.0</u>
	<u>2,378</u>	<u>100.0%</u>	<u>2,378</u>	<u>100.0%</u>	<u>2,378</u>	<u>100.0%</u>

These results indicate the continuing popularity of the semester and quarter systems in the United States and the restricted use of the trimester calendar.

During the late 1950s and early 1960s, there was considerable interest in the trimester system. This interest was generated in part by the adoption of the trimester plan by the University of Pittsburgh and certain colleges and universities in the State of Florida. However, this interest failed to influence American institutions to move away from the semester system.

A comparison of the approximate number of weeks spent by a typical student for classes and examinations on campus for each of the major calendar systems is set out in the table below.

<u>Calendar System</u>	<u>Approximate Total Number of Weeks in Class and Examination Periods</u>
Traditional Year	28-32
Semester	32-36
Trimester (two terms only)	30-32
Quarter (three terms only)	33

A two term attendance at an institution with a trimester calendar can be three or four weeks less than for the semester or quarter systems. Consequently, the quarter system is often preferred over the trimester as it offers a longer academic year.

The above table indicates that the calendar system employed by most Ontario universities and college provides for a shorter academic year than the popular semester and quarter (three terms) systems adopted by most American institutions. In order to further examine this comparison of calendar lengths, we have prepared three bar charts displaying the 1971-72 calendars to include:

- The 14 provincially-assisted Ontario universities
plus the Ontario College of Art, Ryerson Polytechnical
Institute and Royal Military College,
- A selected number of American universities,
- 17 of the colleges of Applied Arts and Technology in
Ontario.

These charts are shown on Exhibits II, III and
IV.

ACADEMIC YEAR CALENDARS

EXAMINATION PERIODS ARE INCLUDED;
REGISTRATION PERIODS ARE NOT.

UNDERGRADUATE INSTRUCTION IN ONTARIO UNIVERSITIES

INSTITUTION	No. of Weeks in Follow-up Session	ACADEMIC YEAR												No. of Weeks in Summer Session
		1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	
		September	October	November	December	January	February	March	April	May	June	July	August	
BROCK UNIVERSITY	27 WEEKS													7 WEEKS
CARLETON UNIVERSITY	31 WEEKS													6 WEEKS
GUELPH UNIVERSITY	42 WEEKS													
LAKEHEAD UNIVERSITY	31 WEEKS													7 WEEKS
LAURENTIAN UNIVERSITY	27 WEEKS													6 WEEKS
McMASTER UNIVERSITY	28 WEEKS													7 WEEKS
	47 WEEKS													
UNIVERSITY OF OTTAWA	30 WEEKS													7 WEEKS
	32 WEEKS													
QUEENS UNIVERSITY	31 WEEKS													7 WEEKS
	37 WEEKS													
ROYAL MILITARY COLLEGE	32 WEEKS													
UNIVERSITY OF TORONTO	32 WEEKS													7 WEEKS
TRENT UNIVERSITY	31 WEEKS													7 WEEKS
UNIVERSITY OF WATERLOO	31 WEEKS													6 WEEKS
	44 WEEKS													
WATERLOO LUTHERAN UNIVERSITY	31 WEEKS													6 WEEKS
UNIVERSITY OF WESTERN ONTARIO	30 WEEKS													7 WEEKS
	32 WEEKS													
	33 WEEKS													
UNIVERSITY OF WINDSOR	28 WEEKS													
	33 WEEKS													
	5													
YORK UNIVERSITY	28 WEEKS													
	3 WEEKS													
ONTARIO COLLEGE OF ART	30 WEEKS													
RYERSON POLYTECHNICAL INSTITUTE	20 WEEKS													

NOTE: ADDITIONAL SPECIAL CALENDARS EXIST FOR SMALL SECTIONS SERVING SPECIFIC UNIVERSITIES.

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ACADEMIC YEAR CALENDARS

UNDERGRADUATE INSTRUCTION IN ONTARIO COLLEGES OF APPLIED ARTS AND TECHNOLOGY

INSTITUTION	No. of Weeks in Full Work Session	ACADEMIC YEAR												No. of Weeks in Summer Session
		September	October	November	December	January	February	March	April	May	June	July	August	
ST. LAWRENCE COLLEGE	32 WEEKS													
ALGONQUIN COLLEGE	32 WEEKS													
SIR SANDFORD FLEMING COLLEGE	33 WEEKS													
LOYALIST COLLEGE	32 WEEKS													
DURHAM COLLEGE	33 WEEKS													
CENTENNIAL COLLEGE	31 WEEKS													
HUMBER COLLEGE	33 WEEKS													
MOHAWK COLLEGE	32 WEEKS													
NIAGARA COLLEGE	31 WEEKS													
	28 WEEKS													
FANSHAW COLLEGE	32 WEEKS													
ST. CLAIR COLLEGE	41 WEEKS													
LAMBTON COLLEGE	31 WEEKS													
CONESTOGA COLLEGE	31 WEEKS													
CAMBRIAN COLLEGE	32 WEEKS													
NORTHERN COLLEGE	32 WEEKS													
	28 WEEKS													
CONFEDERATION COLLEGE	34 WEEKS													
GEORGIAN COLLEGE	31 WEEKS													

PRE-ADMISSION PROGRAM

4 WEEKS

14 WEEKS

8 WEEKS

3 WEEKS

PREPATORY GR. 12 PROGRAM

B. Experience of Some Specific Institutions Visited

As part of our research effort, we visited several universities and colleges in Canada and the United States (listed below) who were known to be operating on year round calendar systems.

<u>University or College</u>	<u>Calendar System</u>
<u>Canada</u>	
Guelph University	Trimester
Simon Fraser University	Trimester (with split summer term)
Ryerson Polytechnical Institute	Trimester (terminated in 1971)
Centennial College of Applied Arts and Technology	Trimester
<u>United States</u>	
University of Michigan	Trimester (with split summer term)
Western Michigan University	Trimester (with split summer term)
Michigan State University	Quarter
University of Florida	Quarter
University of California at Berkeley	Quarter (with split summer term)

We did not visit the University of Pittsburgh, because several research reports were obtained to describe the University's experience with the trimester calendar.

1. University of Guelph

Historically, the founding colleges of the University of Guelph were the Ontario Agricultural College, the Ontario Veterinary College and the Macdonald Institute. These Colleges employed faculty and staff who in addition to teaching were engaged in considerable research and extension for the Ontario Department of Agriculture, and were on campus eleven months of the year. Consequently, as these colleges and their staffs were active year round, it was logical that the University of Guelph adopt a trimester system in 1964. We understand that the trimester calendar was introduced at the request of the Government of Ontario.

At this time, the University uses the trimester calendar system for the degree programs offered by the Colleges of Arts, Biological Science, Physical Science and Social Science (comparable to Faculties of Arts and Science at most other universities). A partial three-semester program is offered by the College of Family and Consumer studies. The undergraduate programs at the Ontario Agricultural College and the Ontario Veterinary College use the two term or traditional year calendar system.

We have prepared a table, Exhibit V, which compares the numbers of students enrolled in each of the three terms by degree program.

SUMMARY OF UNDERGRADUATE ENROLMENT
(ALL FULL-TIME STUDENTS) BY DEGREE PROGRAM
UNIVERSITY OF GUELPH 1970 - 1971

<u>Degree Program</u>	<u>Fall 1970 Number</u>	<u>Winter 1971 Number</u>	<u>1971 Ratio Winter/Fall</u>	<u>Spring 1971 Number</u>	<u>1971 Ratio Spring/Fall</u>
B.Sc. (Agriculture)	964	905	0.94	80	*
B.Sc. (Engineering)	133	125	0.94	2	*
B.L.A. (Landscape Agriculture)	63	61	0.95	1	*
Diploma - Agriculture	217	196	0.90	-	-
B.A.Sc. - (Family & Consumer Studies)	556	533	0.96	114	*
B. Commerce - (Hotel & Food Admin.)	67	62	0.93	1	*
D.V.M. - (Veterinary Medicine)	308	305	0.99	-	-
B.A. (Arts)	2,320	2,376	1.02	1,394	0.60
B.Sc. (Science)	998	882	0.88	334	0.34
B.Sc. (Phys. Ed.)	<u>190</u>	<u>178</u>	<u>0.94</u>	<u>13</u>	*
Total	<u>5,816</u>	<u>5,623</u>	<u>0.97</u>	<u>1,939</u>	*

- (1) * - This program not offered in the Spring Semester; the numbers shown are taking Arts and Science courses in one of the Colleges operating all year.
- (2) - The figures in this table are as of registration day, before any withdrawals.

The trimester calendar system has grown in popularity with Ontario undergraduate students since its introduction in 1965-66. We have prepared a table below which illustrates the pattern of growth over the past seven years.

STUDENT ENROLMENT BY SEMESTERS -
"THREE-SEMESTER PROGRAMS"
UNIVERSITY OF GUELPH 1965 - 1971

	<u>Spring</u> <u>Enrolment</u>		<u>Fall</u> <u>Enrolment</u>		<u>Winter</u> <u>Enrolment</u>		<u>Total</u>
	<u>Number</u>	<u>% of</u> <u>Total</u>	<u>Number</u>	<u>% of</u> <u>Total</u>	<u>Number</u>	<u>% of</u> <u>Total</u>	
1965-66			416		379		795
1966-67	254	10.9%	1,082	46.5%	992	42.6%	2,328
1967-68	521	11.9	1,941	44.3	1,919	43.8	4,381
1968-69	1,081	18.3	2,440	41.3	2,390	40.4	5,911
1969-70	1,404	19.1	3,022	41.1	2,925	39.8	7,351
1970-71	1,630	20.3	3,202	40.0	3,181	39.7	8,013
1971-72	1,663	17.7	3,990	42.6	3,725 (1)	39.7	9,378 (1)

Notes: (1) Estimated

- (2) Enrolment figures are those reported to the Department of Colleges and Universities. Students include "regular students", "continuing students" (those taking further courses in a degree program after having taken a degree) and "special students" (those not working towards a degree, e.g. a student taking make-up courses prior to entering a specialized or graduate program).

The table indicates that until 1970-71, enrolment in the spring term was growing at a faster pace than enrolments in the fall and winter terms. However, this trend changed for 1971-72 with only a very nominal growth

in spring term enrolment compared to an estimated 25% growth in the fall and winter term enrolments. Various reasons were advanced for this reduced interest by students in the 1971 spring term; these included increased competition from summer schools at other universities and the tendency for more students to travel in the summer.

It is too early to predict if this lack of growth will continue for the spring term. The University predicts an increase of 11% to 1,845 registrants in the spring term, 1972.

A major factor affecting utilization of facilities and operating costs at the University of Guelph is the number of courses offered in each term, and the number of times that it is necessary to repeat classes (or course-sections) in a given course. In the following paragraphs, we describe in some detail the extent to which the University adjusts the numbers of course offerings and sections by term.

We have prepared a table below to compare the numbers of course-section offerings with enrolments by term and to determine the extent to which the University has been able to keep course offerings in line with enrolments.

COMPARISON OF COURSE-SECTION OFFERINGS
WITH ENROLMENTS BY "YEAR"
UNIVERSITY OF GUELPH 1971-1972

	Spring		Fall		Winter		Total	
	Course Sections	Enrol- ment	Course Sections	Enrol- ment	Course Sections	Enrol- ment	Course Sections	Enrol- ment
Freshman	57	637	128	1,378	89	1,191	274	3,206
% of Total	21%	20%	47%	43%	32%	37%	100%	100%
Sophomore	72	448	120	907	119	886	311	2,241
% of Total	23%	20%	39%	41%	38%	39%	100%	100%
Junior	67	443	126	637	150	759	343	1,839
% of Total	20%	24%	36%	35%	44%	41%	100%	100%
Senior	39	120	101	244	96	279	236	643
% of Total	17%	19%	43%	38%	40%	43%	100%	100%
All Years	235	1,648	475	3,166	454	3,115	1,164	7,929
% of Total	20%	21%	41%	40%	39%	39%	100%	100%

Notes: Numbers of Course-Sections were compiled from the published class schedules for the spring 1971, fall 1971 and winter 1972 semesters. The enrolment figures pertain to regular students of corresponding semesters of the previous year, i.e. on the premise that the 1971-72 schedule would be planned from the 1970-71 enrolments of "regular" students.

The above table indicates that there is a good matching of course offerings with students enrolments in each of the terms.

We undertook some further analysis to determine how many different course-sections are planned to be run in each of the three terms 1971-72, and the frequency with which courses are repeated. The results of this analysis are shown by discipline on the schedule shown as Exhibit VI.

TABULATION OF COURSES OFFERED AND THE
NUMBER OF COURSE-SECTIONS BY TERM
UNIVERSITY OF GUELPH 1971-72

Academic Departments	Number of Course Sections			Number of Courses Given				Total
	Spring	'71 Fall	'71 Winter	In Three		In One		
				Terms	Terms	Term Only	Term Only	
Botany	2	17	20	2	6	22	30	
Chemistry	15	32	36	8	15	16	39	
Computing Science	3	9	11	3	2	8	13	
Economics	12	21	22	4	10	19	33	
English	30	89	73	2	32	12	46	
French	14	26	23	3	10	17	30	
Geography	15	27	17	6	12	16	34	
German	0	12	13	*0	1	22	23	
History	20	25	31	5	7	45	57	
Mathematics	13	30	30	7	12	18	37	
Philosophy	35	57	51	16	7	21	44	
Psychology	24	32	33	16	7	6	29	
Physics	11	21	20	5	11	12	28	
Political Science	15	23	23	6	3	37	46	
Sociology	21	34	31	5	16	30	51	
Zoology	5	20	20	5	6	18	29	
Total	235	475	454	93	157	319	569	
%	20%	41%	39%	16%	28%	56%	100%	

* Courses in German are not offered in the Spring semester

Source: Analysis of University of Guelph published time tables 1971-1972.

These results are summarized as follows:

	<u>1971-72 Academic Year</u>	
	<u>Number of Courses</u>	<u>Percentage of Total Courses Offered</u>
Courses offered at least once in each of <u>three</u> terms	93	16%
Courses offered at least once in each of <u>two</u> terms	157	28
Courses offered in <u>one</u> term only	<u>319</u>	<u>56</u>
Totals	<u>569</u>	<u>100%</u>

These results indicate that less than one-half of the courses are repeated each year, and consequently the student may not get exactly the course mix that he wants each term. However, it is probable that the student should get at least an acceptable substitute course.

It is recognized at Guelph that the operation of the spring semester requires larger faculties than would be the case were they not on year round operation. (The spring term faculty is about 50% of the size of the corresponding fall or winter faculties which reflects the variation in the student enrolment).

In summary, the Guelph experience with the trimester calendar appears to be relatively successful and the University appears to be meeting a need in the province by providing programs which allow students to accelerate or alter the timing of their on-campus life.

2. Ryerson Polytechnical Institute

In 1966 Ryerson Polytechnical Institute adopted a trimester plan. The plan was eventually discontinued in 1971 due to low summer enrolments. The following table shows the summer term enrolments and the percentage of summer term enrolments to the previous fall term enrolments from 1966 to 1971.

RYERSON SUMMER TERM ENROLMENT COMPARED
WITH PREVIOUS FALL TERM

<u>Summer Term</u>	<u>Summer Term Enrolment</u>	<u>Percent of Summer Term Enrolment to Previous Fall Term Enrolment</u>
1966	638	17.8
1967	831	18.4
1968	897	17.4
1969	819	14.1
1970	752	13.0
1971	381	6.0

The extent of disinterest on the part of students is illustrated further by the decline over the past years in the numbers of freshmen students prepared to enrol in the summer term as their first semester. The freshmen enrolments for the fall and summer terms in the Business Administration and Engineering Technology faculties are compared in the table below.

RYERSON POLYTECHNICAL INSTITUTE
COMPARISON OF FRESHMEN ENROLMENTS FOR
FALL AND SUMMER TERMS (BUSINESS
ADMINISTRATION AND ENGINEERING TECHNOLOGY)

	<u>Fall Term</u>	<u>Summer Term</u>
1965-66	429	133
1966-67	616	136
1967-68	867	114
1968-69	946	102
1969-70	966	83
1970-71	1,166	Not Offered

3. Simon Fraser University, British Columbia

Simon Fraser University adopted the trimester system when the University opened in September, 1965. Degrees are offered in the faculties of Arts, Science and Education.

Since opening, the University has had an imbalance in student enrolments by semester - particularly in the summer semester. The table below shows the student enrolment by term of 1968-69 and indicates a less than proportionate share of enrolment in the summer term.

SIMON FRASER UNIVERSITY
FULL TIME EQUIVALENT STUDENT ENROLMENTS

	<u>Summer Semester 1968</u>	<u>Fall Semester 1968</u>	<u>Winter Semester 1969</u>	<u>Total Three Semesters</u>
Arts	1,255	2,649	2,881	6,785
Education	535	1,136	1,223	2,894
Science	<u>337</u>	<u>723</u>	<u>751</u>	<u>1,811</u>
Total Undergraduate	2,127	4,508	4,855	11,490
Graduate	<u>293</u>	<u>459</u>	<u>505</u>	<u>1,257</u>
Total	<u>2,420</u>	<u>4,967</u>	<u>5,360</u>	<u>12,747</u>
Percentage of Total	19%	39%	42%	100%

The number of teaching faculty (full-time equivalent) providing instruction in the summer term declines as shown in the table below.

SIMON FRASER UNIVERSITY
PERCENTAGE BY SEMESTER
FULL-TIME EQUIVALENT OF
TEACHING FACULTY

	Academic Year Summer, 1968 to Winter, 1969			
	<u>Summer 1968</u>	<u>Fall 1968</u>	<u>Winter 1969</u>	<u>Academic Year</u>
Arts	23%	40%	37%	100%
Education	18	42	40	100
Science	18	41	41	100
University	20%	41%	39%	100%

In summary, the activity levels in the summer semester run about one-half of the activity levels in the fall and winter semesters, when measured both in numbers of full-time equivalent students on campus and full-time equivalent teaching faculty.

A factor which can affect significantly the costs of a year round operation is the number of courses repeated within each year. The table below sets out the extent to which courses were repeated in the academic year 1968-69.

TABLE OF ANNUAL COURSE REPEAT FACTORS AT
SIMON FRASER UNIVERSITY 1968-69 (NOTE)

	<u>First Year Courses</u>	<u>Second Year Courses</u>	<u>Third Year Courses</u>	<u>Fourth Year Courses</u>	<u>Total for Four Years</u>
Arts	2.5	2.1	1.6	1.6	1.8
Education	3.0	2.5	1.6	2.0	2.1
Science	<u>2.6</u>	<u>2.8</u>	<u>1.8</u>	<u>1.5</u>	<u>1.9</u>
Total	<u>2.5</u>	<u>2.2</u>	<u>1.7</u>	<u>1.6</u>	<u>1.8</u>

Note: Repeat Factor equals the number of course-offerings divided by the number of courses.

The above table indicates a relatively high incidence of 'repeated courses', which if combined with fairly low enrolments in certain faculties, can result in a large number of under-enrolled classes and low student/staff ratios.

The University has undertaken extensive studies during the past two years to determine the costs of repeating courses and of sustaining under-enrolled uneconomic class sizes in certain faculties. We discuss the results to date of this cost study in Chapter VI, Section C.

4. University of Michigan

In 1963, the University of Michigan introduced a trimester calendar. The 1970-71 academic year was made up of the following components:

	Period (Note)	
	<u>Dates</u>	<u>Number of Weeks</u>
Fall Semester	August 31 - December 19, 1970	16
Winter Semester	January 4 - April 27, 1971	16
Spring/Summer Semester	May 3 - August 21, 1971	16
Spring Half-term	May 3 - June 25, 1971	8
Summer Half-term	June 28 - August 21, 1971	8

Note: The above term periods include registrations, classes and examinations.

The University Administration provided us with enrolment data for the 1969-70 academic year (commencing with the summer half-term 1969) indicating the levels of activity by term.

UNIVERSITY OF MICHIGAN -
UNDERGRADUATE STUDENTS

	<u>Head-Count Full-Time Students</u>		<u>Full-Time Equivalents</u>		<u>Course Credit Hours</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Summer Half-term 1969	5,785	10.6%	2,257	5.0%	34,980	5.0%
Fall Semester 1969	22,560	41.3	21,350	47.1	330,916	47.1
Winter Semester 1970	21,331	39.0	19,863	43.8	307,873	43.8
Spring Half-term 1970	<u>4,970</u>	<u>9.1</u>	<u>1,878</u>	<u>4.1</u>	<u>29,119</u>	<u>4.1</u>
Totals	<u>54,646</u>	<u>100.0%</u>	<u>45,348</u>	<u>100.0%</u>	<u>702,888</u>	<u>100.0%</u>

The above table indicates imbalance or the extent to which activity drops off in the summer, particularly when measured in terms of full-time equivalent students and course credit hours.

Some of the more interesting features and comments on the University of Michigan experience are listed below.

- a) No special inducements are offered to students to enrol in one semester as opposed to another.
- b) Only limited numbers of students have taken advantage of the trimester system to accelerate their programs. The student body in the spring and summer half-terms is composed largely of individuals holding full-time employment outside of the University during the remainder of the year.
- c) Both faculty and students believe that specific academic activities such as assimilation of material, review of material, term papers, adequate study period, four examination periods, extra-curricular activities and senior theses have been hampered by the time constraints imposed by the present calendar with the reduced term lengths.
- d) The major influx of new students is in the fall semester. Limited numbers of new students are admitted in the winter semester and spring half-session.

- e) Faculty contracts are for nine months normally covering the fall and winter semesters. During that period, the faculty member actually works eight months. A faculty member can teach in either the spring or summer half-term for two-ninths (22%) of his academic year salary. Because of the financial incentive, teaching in the spring or summer half-terms has attracted a large number of junior faculty. The extent of course offerings during these two half-sessions appears to have been constrained solely by the level of support which the University was willing to provide for faculty salaries.

5. Western Michigan University

Western Michigan University has adopted the same trimester calendar format as the University of Michigan except that the two spring/summer terms are of slightly longer duration.

The University administration provided us with comparative data on undergraduate enrolment by semester for 1970-71 (commencing with summer half-term 1970) which is set out in the table below.

WESTERN MICHIGAN UNIVERSITY - UNDERGRADUATES

	Head-Count Full-time Students		Full-time Equivalents Full-time Students	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Summer Half-term 1970	3,973	8.1%	3,269	7.4%
Fall Semester 1970	18,892	38.6	17,451	39.4
Winter Semester 1971	17,982	36.7	16,364	36.9
Spring Half-term 1971	<u>8,095</u>	<u>16.6</u>	<u>7,226</u>	<u>16.3</u>
	<u>48,942</u>	<u>100.0%</u>	<u>44,310</u>	<u>100.0%</u>

These figures indicate the extent of inactivity during the spring and summer half-terms. The reasons for imbalance are the same as those listed for the University of Michigan.

6. Michigan State University

Michigan State University operates on a quarter system with the following terms:

<u>Quarter</u>	<u>Approximate Term Dates</u>	<u>Total Weeks</u>
Fall	October 1 - December 18	11
Winter	January 2 - March 15	11
Spring	March 31 - June 15	11
Summer	June 23 - August 31	<u>11</u>
		<u>44</u>

The University operates an abbreviated summer session of five weeks in addition to the summer quarter.

We were told that most of the enrolment in the summer quarter is in the five-week summer session.

There are four admission, registration and examination periods during the calendar year.

Faculty normally teach the fall, winter and spring quarters. Extra pay of one-third annual academic salary is paid to those faculty members who teach in the summer.

The University enrolment by term follows the general pattern of the other institutions, with a significant drop in activity in the summer quarter as shown in the table below.

MICHIGAN STATE UNIVERSITY -
GRADUATES AND UNDERGRADUATES
(Full-time and Part-time Students)

<u>Quarter</u>	<u>Head Count</u>		<u>Full-time Equivalent</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Summer - 1970	17,329	12.9%	8,478	8.0%
Fall - 1970	40,511	30.2	34,031	32.3
Winter - 1971	38,785	28.9	32,519	30.8
Spring - 1971	<u>37,491</u>	<u>28.0</u>	<u>30,389</u>	<u>28.9</u>
Total	<u>134,116</u>	<u>100.0%</u>	<u>105,417</u>	<u>100.0%</u>

The University provided figures to indicate the significant reductions in the number of course-sections

offered during the summer quarter to compensate for reduced enrolments.

COURSE-SECTION SIZE ANALYSIS

Number of Students Enrolled By Course-Section	Summer 1970		Fall 1970 (Note)		Spring 1971	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Over 200	Nil		Nil		Nil	
101 - 200	28	3%	170	4%	146	4%
51 - 100	120	12	458	10	414	11
36 - 50	128	14	543	13	456	12
21 - 35	271	28	1,691	39	1,254	32
11 - 20	282	29	1,119	25	1,123	29
1 - 10	<u>140</u>	<u>14</u>	<u>409</u>	<u>9</u>	<u>470</u>	<u>12</u>
	<u>969</u>	<u>100%</u>	<u>4,390</u>	<u>100%</u>	<u>3,863</u>	<u>100%</u>

Note: Figures not available for winter term.

The above table indicates that the percentage distribution of class-section sizes by quarter showed little change because of a significant reduction in the number of course sections offered in the summer quarter.

The staff members at the University interviewed by us pointed out a number of problems associated with the operation of the quarter system.

Attempts to keep the enrolment in the summer term comparable to that of the other terms have failed because

of the following factors:

- faculty want the summer quarter off,
- students want the summer quarter off,
- the reduced number of course offerings in the summer term is not attractive to students,
- there is an apparent lack of job opportunities for students at times other than during the summer period.

The quarter system is characterized by a brevity of time span for individual courses. Thus, there is insufficient time to get acquainted with students. Furthermore, it encourages faculty to think of their courses as separate and distinct from those taught by other faculty. In brief, the quarter system contributes to a lack of feeling for continuity and sequential learning.

7. University of Florida

The University of Florida used a semester calendar system prior to 1960. In the early 1960s, all post-secondary institutions were ordered, by the Florida State Legislature, to commence year round operations. The University adopted initially a trimester calendar and later adopted the quarter calendar which it uses now. A major reason for this change from a trimester to a quarter system was to extend the school year for most students as shown in the table below.

	<u>Number of Weeks on Campus</u>
Semester (2 semesters of 16 weeks)	32
Trimester (2 semesters of 13 weeks)	26
Quarter (3 quarters of 11 weeks)	33

The above table illustrates the equivalent numbers of weeks for the semester and quarter systems.

The University Administration provided us with data to compare the activity in the fall and summer quarters. A summary of full-time enrolments by major division are shown on the schedule Exhibit VII. Enrolment of full-time undergraduates in the summer quarter amounted to only 36% of fall enrolments.

Relatively few students have accelerated their programs using the summer quarter and the majority of freshmen register at the beginning of the fall quarter.

8. University of California at Berkeley

This University adopted a quarter calendar system in 1966. Under the four quarter calendar, the University agreed that the summer quarter would be funded to the same extent as the other three quarters which make up the traditional academic year. This arrangement lasted through the summer quarter, 1969. Because of financial constraints imposed by the Governor and the Legislature, the Board of

SUMMARY OF FULL-TIME ENROLLMENTS
BY MAJOR DIVISION

UNIVERSITY OF FLORIDA, 1970-71

Faculty or Department	Undergraduate			Graduate		
	Fall-1970	Summer-1971	Ratio Summer/Fall	Fall-1970	Summer-1971	Ratio Summer/Fall
Agriculture	374	208	0.55	344	348	1.01
Architecture	892	380	0.42	53	27	0.51
Arts and Science	2,602	1,322	0.50	1,154	764	0.66
Business Administration	1,105	537	0.48	281	225	0.80
Education	1,588	1,046	0.66	826	978	1.18
Engineering	1,125	427	0.38	498	465	0.93
Forestry	104	51	0.49	24	18	0.75
Health - Professions	172	38	0.22	60	38	0.63
Journalism	818	429	0.52	47	36	0.77
Nursing	220	134	0.61	43	67	1.56
Physical Education	304	148	0.49	28	37	1.32
Pharmacy	196	78	0.40	18	18	1.00
University College Freshmen and Sophomore Years Only	7,899	1,401	0.18	-	-	-
Total	17,399	6,199	0.36	3,376	3,021	0.89

Regents of the University decided to modify the calendar to that which presently prevails - three quarters of eleven weeks each plus two summer sessions of five and one-half weeks each, the latter to be self-supporting in terms of direct operating costs.

While the quarter system lasted only three years, there was little evidence that students chose to accelerate their programs. Rather, the vast majority of students in the summer quarter used it to make up either deficiencies or courses missed.

9. University of Pittsburgh

Although we have not visited the University of Pittsburgh, we have studied much of the research concerning the trimester calendar system initiated by this University in 1959-60. Of particular interest is a report prepared by a Special Committee of the Ford Foundation and dated January, 1966, examining the causes for the University's financial difficulties, which built up over a number of years. The report concludes that the trimester system was a major contributor to these financial difficulties.

The Committee stated in their report that:

The hypothetical economies of the Pittsburgh trimester experiment were predicated upon certain assumptions: it would benefit the bulk of students by affording them the opportunity to complete degrees in fewer

calendar years; this attraction would, in turn, increase total enrolments; further, summer enrolments would be maintained at near winter levels so that the physical plant and other fixed resources would be used evenly throughout the year; and thus, equivalent education could be provided for a student at lower cost than under the traditional semester or quarter systems.

What has the test of the trimester plan at Pittsburgh revealed about these assumptions? The most conspicuous failure of expectation has already been cited: the system has simply not proved the spring (third) semester to be any more attractive to regular students than the summer session associated with the conventional plans. The figures below express the retention rate of the spring semester for 1964-65 as a percentage of the enrolment in the fall term. As can be seen, total enrolment in the spring was less than half that of the fall, and full-time enrolment was less than one-third.

	<u>Fall</u>	<u>Spring</u>
Full-time	7,725	27.9%
Part-time	7,109	70.6
Undergraduate	9,058	42.9
Full-time undergraduate	4,749	23.8
1st Professional	3,613	47.2
Graduate	2,125	72.1
Total University	14,837	48.4

Source: The University of Pittsburgh: A Selective Review With Proposals for the Future Paths, New York: A Report by a Special Committee of the Ford Foundation, January, 1966. Pages 10-11.

In order to give the trimester calendar a firm trial, the University had committed itself completely to year round operation. The University ensured year round faculty availability by paying 70% of the teaching staff twelve months' salaries. As a consequence, low enrolments in the spring semester made the system expensive.

The Ford Foundation Report attributes the poor student response to the trimester system as a major cause for the serious financial difficulties encountered by the University. Operating deficits totalling \$15,500,000 were incurred over the five years 1959-60 to 1963-64, due in part to the extra costs of the trimester program.

C. The Colleges of Applied Arts and Technology in Ontario

Generally speaking, the Colleges of Applied Arts and Technology in Ontario have adopted either the traditional year or semester calendar systems for post-secondary education. Including registration, classes and examination periods, the academic school year varies generally from 31 to 33 weeks. The chart, shown earlier, illustrates the academic year calendar for 17 of the Ontario Colleges.

We obtained from the Department of Colleges and Universities statistics on full-time and part-time summer enrolments for the Colleges during the 1971 summer term. These figures are set out in the table below.

TABLE OF SUMMER ENROLMENTS FOR
THE COLLEGES OF APPLIED ARTS AND TECHNOLOGY IN ONTARIO

	Part-time Students			Full-time Students Post-Secondary
	Post- Secondary	Other Programs	Total	
Algonquin	512	433	945	78
Cambrian	184	62	246	
Centennial	1,114		1,114	94
Conestoga				
Confederation	297		297	
Durham	26	17	43	
Fanshawe	111	430	541	
George Brown	399	565	964	902
Georgian	216	389	605	
Humber	8		8	461
Lambton	33	27	60	
Loyalist				
Mohawk	544	480	1,024	70
Niagara	95	194	289	
Northern				
Seneca	1,352	1,900	3,252	298
Sheridan	337	873	1,210	
Sir Sandford Fleming	228	219	447	
St. Clair	230	45	275	
St. Lawrence		200	200	
Total	<u>5,686</u>	<u>5,834</u>	<u>11,520</u>	<u>1,903</u>

These figures can be compared to the estimated full-time enrolment for the fall term, 1971 of 35,355 students. We have no way of determining a full-time equivalent for the summer part-time enrolment in those Colleges offering eight to ten week summer programs for purposes of up-grading students and for students who wish to make up deficiencies.

We discussed, with College Administrators, the experience with the trimester calendar at Centennial

College for post-secondary education. Although exact figures were not available at the time of our meetings, the College indicated that the 1971 summer semester attracted only about 100 students - or 10% of the normal fall and winter terms' enrolments in post-secondary education.

Those Colleges providing facilities for Adult Retraining, Apprenticeship, and Continuing Education programs have more activity during the spring and summer months. A review of average activity for five of the Colleges indicated the following results for 1970-71:

	<u>Average Activity for Five Colleges</u>			
	<u>Fall</u> <u>Term</u>	<u>Winter</u> <u>Term</u>	<u>Spring/Summer</u> <u>Period</u>	<u>Total</u>
Adult Retraining and Apprenticeship	38.6%	45.3%	16.1%	100.0%
Continuing Education	46.5%	40.6%	12.9%	100.0%

In summary, the activity at the Colleges is concentrated mainly in the fall and winter terms. Attempts by certain Colleges to attract students to summer programs have not been too successful until now except for some of the Colleges located in large metropolitan areas.

CHAPTER VI - CERTAIN MAJOR ISSUES RELATED TO YEAR ROUND OPERATION

A. Demand for Student Places

In the face of rising student enrolments and increasing educational costs, public and government agencies are looking to year round operation as a means of creating new student places at low cost. Students and the universities themselves, in addition to seeking certain academic benefits, will eventually turn the shortage of student places into pressure for better utilization of university facilities. It is not the purpose of this report to try and predict the extent of this shortage. However, the potential significance of a shortfall in student places is referred to in the text 'Towards 2000', where the authors predict a shortfall in full-time undergraduate student places of 30,100 at Ontario universities by the academic year 1975-76; a demand for 176,400 places when only 146,300 places are expected to be available.*

In order to set a background for our study, we examined briefly post-secondary student enrolment projections for the next twenty years in Ontario. In addition, enrolment projections are an essential input to the 'cost model' described later in this report. Our source for the enrolment projection figures is the report prepared for the Commission on Post-Secondary Education in Ontario entitled 'Manpower Forecasting and Educational Policy'.

*References may be found at the end of the chapter.

In order to illustrate the anticipated trends in enrolments for Ontario universities and colleges over the next twenty years, we have prepared two graphs from the projection figures shown as Exhibits VIII and IX. These graphs suggest the following pattern:

1. Universities

- a) The demand for full-time undergraduate student places will increase by 90% - 100% or practically double between 1971 and 1985;
- b) After 1985, the demand for places will level off and, in fact, it is predicted that the demand will begin to decrease.

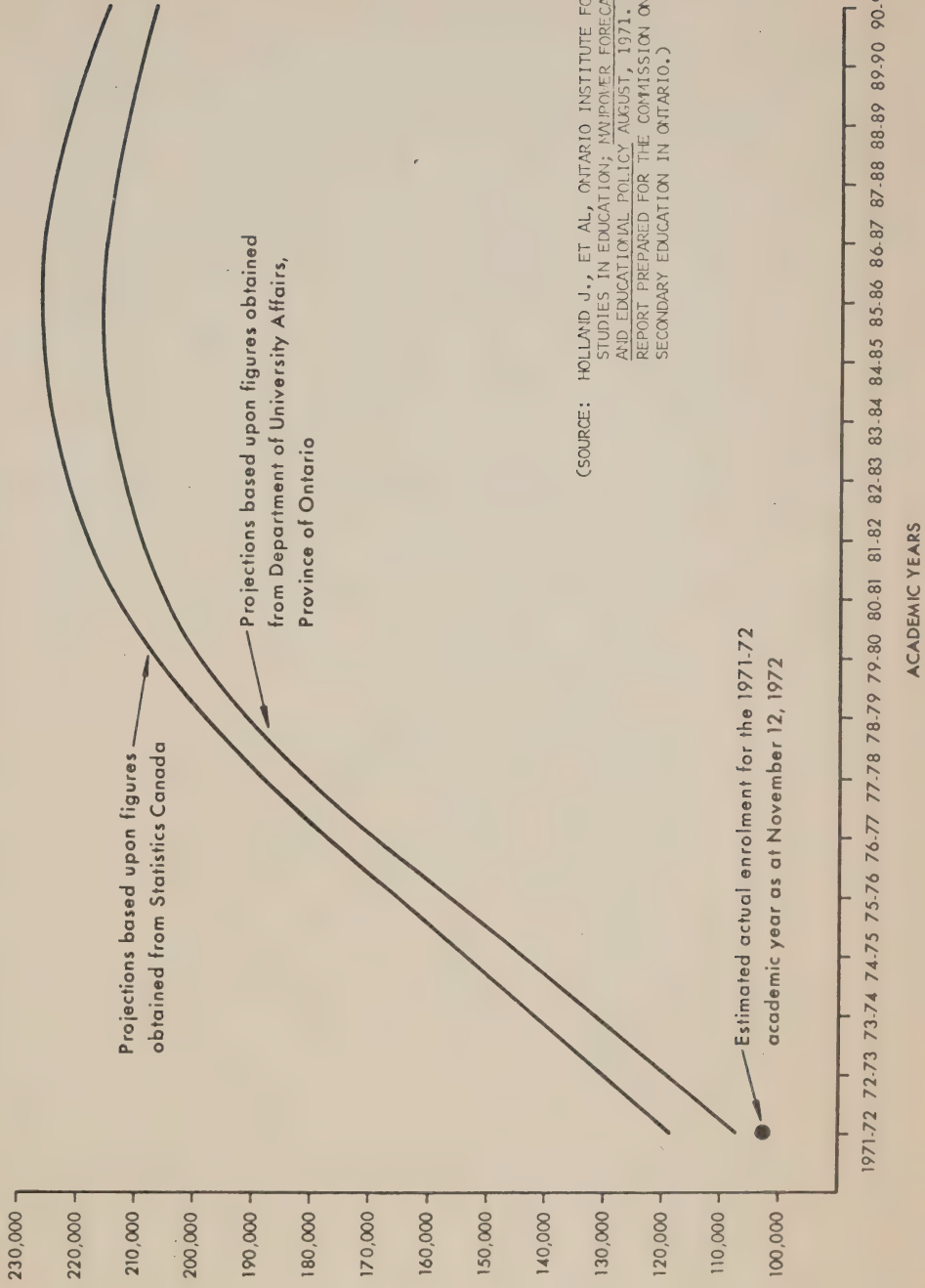
Actual enrolments for the current 1971-72 academic year are below the Ontario Department of Colleges and Universities estimates by 6,400 students. We are not in a position to estimate the effect of this shortfall on enrolments in future years, but it is conceivable that the growth factors indicated on the graph could be reduced fairly significantly over the next twenty year period.

2. Colleges of Applied Arts and Technology - Post-Secondary Education

- a) By 1980, it is predicted that the demand for student places will be more than double the 1971 demand.
- b) The anticipated growth for the years 1981-1990 will moderate considerably to an annual average rate slightly above 5% over the ten year period.

GRAPH OF ESTIMATED NUMBERS OF UNDERGRADUATE FULL-TIME STUDENT ENROLMENTS FOR PROVINCIALLY SUPPORTED UNIVERSITIES IN ONTARIO FOR THE PERIOD 1971-72 TO 1990-91

(SEE NOTE BELOW FOR SOURCE)

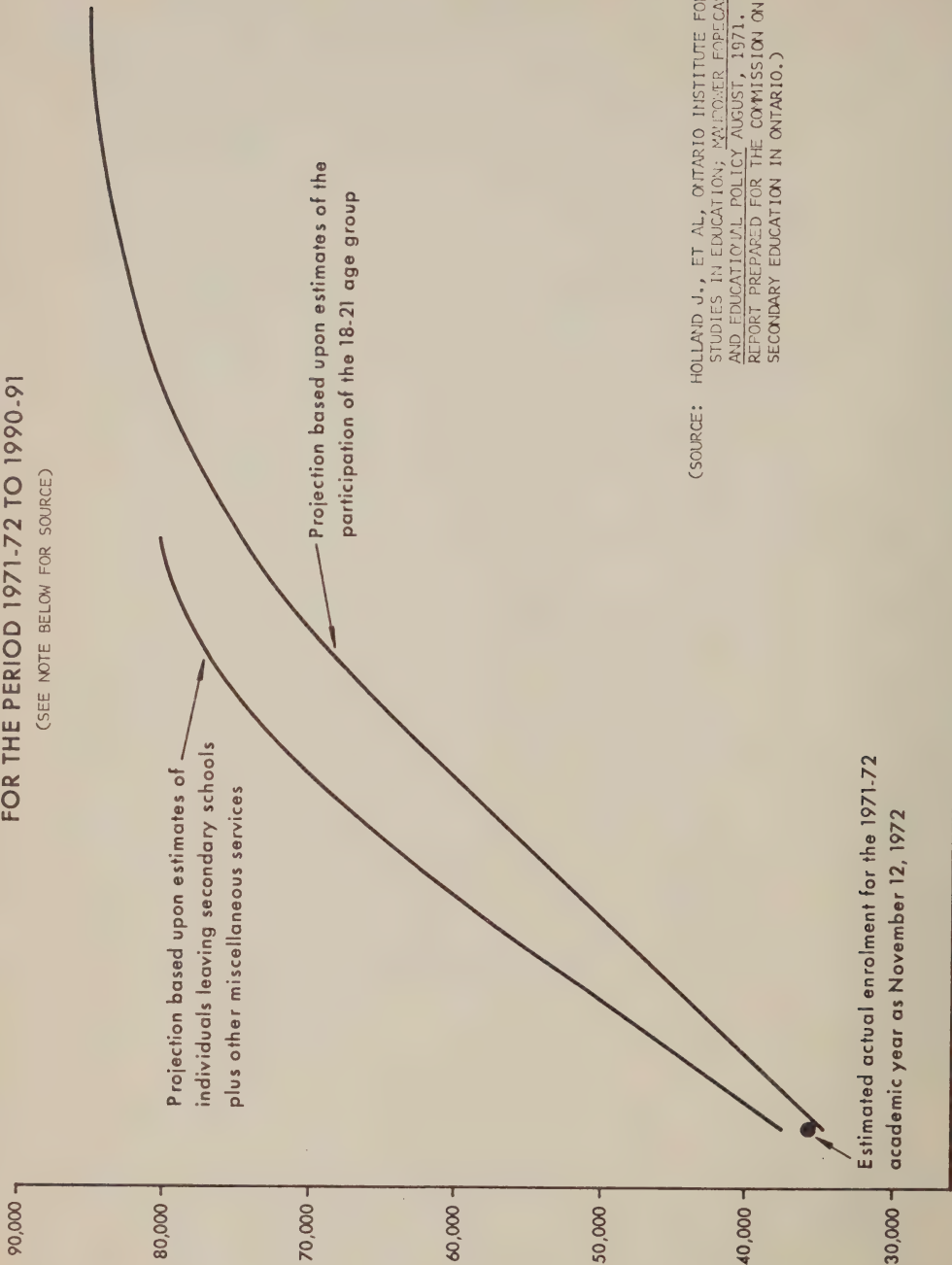


(SOURCE: HOLLAND J., ET AL, ONTARIO INSTITUTE FOR STUDIES IN EDUCATION; MAJUMDER, FORECASTING AND EDUCATIONAL POLICY, AUGUST, 1971. A REPORT PREPARED FOR THE COMMISSION ON POST-SECONDARY EDUCATION IN ONTARIO.)

GRAPH OF ESTIMATED NUMBERS OF FULL-TIME STUDENT ENROLMENTS FOR THE COLLEGES OF APPLIED ARTS AND TECHNOLOGY IN ONTARIO

FOR THE PERIOD 1971-72 TO 1990-91

(SEE NOTE BELOW FOR SOURCE)



(SOURCE: HOLLAND J., ET AL, ONTARIO INSTITUTE FOR STUDIES IN EDUCATION; WILCOXER, FORECASTING AND EDUCATIONAL POLICY AUGUST, 1971. A REPORT PREPARED FOR THE COMMISSION ON POST-SECONDARY EDUCATION IN ONTARIO.)

The colleges, like the universities, have not achieved the 1971-72 enrolment projections, having a shortfall of about 1,500 full-time students, based upon an estimate provided to us by the responsible Government Department.

In summary, although the current 1971-72 experience of enrolment shortfalls from projections raises the question of the accuracy of long-term enrolment projections available at this time, there was an increase in total numbers of students enrolled in 1971-72 compared to the immediately preceding year. Also, the demand for student places at Ontario universities and colleges will sustain a significant growth factor over this next ten year period to 1980-81.

3. Summary

It is of particular significance that this growth in demand is expected to level out during the 1980s; in fact, total undergraduate enrolments at Ontario universities could begin to decline after 1985-86. Therefore, the Ontario universities may have to adopt new operating methods, such as an extended calendar, to meet the peak enrolment situations, rather than add the capital facilities with the capacity to meet peak enrolments (based upon present-day criteria for utilization).

B. The Supply of Student Places

After examining the continuing trend of growth in the demand for student places, the major question to be answered is: how can the post-secondary system best meet this demand at a reasonable cost and without sacrificing academic quality? There are a number of choices open for creating more student places within the Ontario system and these approaches might be expected to take the following order of priority:

- a) Through better high-level planning and scheduling of operations, improve the utilization of all resources (to include capital facilities and academic staff) within the two term system most common to Ontario post-secondary institutions.

For example, some programs and facilities are duplicated at several institutions. Sometimes the duplication can be avoided. Also, section sizes can sometimes be increased without sacrificing quality. There is much room for improvement in the teaching utilization of faculty at both the universities and the colleges. There is a far greater return from, say, a 10% increase in staff utilization than from a 50% increase of undergraduate space utilization.

- b) Extend the length of the academic day, week or year, either at selected or all institutions within the province, to increase utilization and the number of student places available, while maintaining the conventional year system.
- c) Change to a year round system (trimester, quarter).
- d) Re-allocate student enrolments by institution so that those universities and colleges that have available student places will be filled, and conversely certain institutions that are overcrowded will be partially relieved of the crowding.

We examine below in some detail the possibilities of effecting improvements in the utilization of existing capital facilities both within the existing calendar system and by means of extending the academic year.

1. Utilization of Existing Facilities

It is difficult to determine the extent of utilization of existing resources available at post-secondary institutions in Ontario. Only very recently has information of any real significance become available on the utilization of facilities in Ontario.

a) Universities

A draft report, prepared by the consulting firm of Taylor, Lieberfeld and Heldman, and entitled 'Ontario Universities Physical Resources Study'

was submitted to the Department of Colleges and Universities of Ontario in October, 1971. This draft report provides guidelines on the extent to which the physical plants were utilized in the academic year 1967-68, which was the academic year chosen to collect information on class schedules. In order to develop utilization figures for the Ontario universities, first it was necessary to analyze how the space was being used. The normal practice is to identify the useable space of buildings which is referred to as 'net assignable space'. As further explanation, some definitions are set out below.

Gross Space - total enclosed space, including residence halls. The total is based on measurements of outside dimensions of all campus buildings owned, rented or leased.

Net Assignable Space - the sum of all building areas that can be devoted to specific uses such as classrooms, laboratories, libraries, offices, residences, etc.

Non-Assignable Space - the sum of all areas used for custodial, circulation, mechanical and structural purposes.

The Taylor, Lieberfeld and Heldman report estimated that 55% of the gross space available to the fourteen provincially-supported universities in Ontario was net assignable space in 1967-68. This net assignable space was used as follows:

Classroom and Special Purpose Space	35%
Offices	17
Libraries	8
Residential	18
Other Uses	<u>22</u>
	<u>100%</u>

Approximately one-half of 'classroom and special purpose space' (or about 17% of net assignable space) was devoted to student instruction, emphasizing the fact that only a small percentage of a total university space is actually devoted to student instruction. Upon examination of space utilization studies made in other jurisdictions, we found these figures for universities to be quite comparable to the Ontario situation.

These figures demonstrate that instructional space makes up only a small part of the total space required by a university. If the utilization of instructional space was improved upon over the

summer months by year round operation, it is not likely that substantial savings in capital costs would be realized. Also, these figures show that much of a university is already in use year round by faculty and graduate students occupying offices, research facilities, libraries, etc.

The recent Taylor, Lieberfeld and Heldman study discussed the extent of utilization of space devoted to instructional purposes.

Based upon the 1967-68 study results for 14 of the provincially-supported universities, the report suggests that there was less than optimum utilization of instructional space available at that time. To quote from their report:

"Student station utilization in classroom facilities averaged 64%, but full capacity utilization averaged only 21%. Laboratory student station utilization on average was 74% during scheduled hours, but full capacity utilization was only 14%. (Student station utilization represents the proportion of available station capacity utilized or assigned to students during the hours when classes are scheduled in particular rooms. Capacity utilization represents the rate at which available station capacity is occupied over the course of the entire teaching week)".

We understand that the teaching week averaged 45 hours per week for all of the universities.

The report went on to say that "utilization dropped off sharply in almost all facilities towards the end of the week. Similarly, morning use tended to be greater than afternoon use."

A major step taken by the Province of Ontario to improve utilization was the introduction of the Interim Capital Formula in 1969-70 as a means of allocating funds to universities for the construction of new capital facilities. We have been told by officials at the Department of Colleges and Universities of Ontario that the use of the formula has provided constraints on the universities in the amount of new space constructed, and that the formula constraint has helped to correct an imbalance in the types of facilities which existed in the past.

The Report of the Committee on University Affairs of Ontario 1969-70, predicted that the surplus of space available compared to requirements (based upon the Interim Capital Formula for Ontario) which existed in 1969-70 would become a deficit in 1971-72 and that this deficit would continue through 1974-75.

The Interim Capital Formula allows for 96 net assignable square feet per full-time equivalent

student (or approximately 125 net assignable square feet per full-time student) and provides a unit cost of \$55 per square foot.

We have been informed by both Government officials and Taylor, Lieberfeld and Heldman that allowable square footage of 96 is likely generous. However, the unit cost figure of \$55 was determined from 1968 estimated capital costs less a factor of 20%, and no adjustment or escalation has been made to this unit cost figure despite price increases since 1968. Therefore, it is likely that the universities have been forced to build new facilities using a reduced space factor (less than 125) per full-time student to compensate for the low unit cost allowance under the formula.

Despite these constraints, the general opinion of Government officials and Taylor, Lieberfeld and Heldman is that there is still room for better utilization and, in their opinion, one approach to improving facilities utilization would be to employ more sophisticated class scheduling techniques. This would suggest that further steps are planned in the future to improve utilization.

We believe that these findings tend to support our conclusion that the issue of year round student

attendance as a means of reducing capital costs is exaggerated. In our opinion, overall utilization figures are necessarily low and cannot be greatly improved by switching to year round operation. In the first place, most university facilities are open and used even when summer instruction is not being carried out. Second, the classroom and laboratory space (and equipment) devoted to undergraduate instruction is a small percentage of total campus space (and equipment). Third, even when classrooms and laboratories are in use, their seat utilization is often low. Graduate students are considered to be attending year round.

We appreciate that there are circumstances which limit the utilization of facilities provided at universities. Whenever there are shared uses of facilities (i.e. education, research) high utilization is difficult to plan and sustain. Also, certain unique facilities must be acquired and made available to offer a wide range of programs, and it is not always possible to attract the necessary numbers of students or develop a demand that creates efficient use of such facilities. However, there is evidence that real opportunities are available for improving the utilization of university space and facilities within the existing two term

calendar system. In fact, it is probable that better planning of university space and facilities will offer greater opportunities for improvement than the benefits derived from a shift to year round operations.

b) Colleges of Applied Arts and Technology

Although no comprehensive report is available on the utilization of the Ontario Colleges' capital facilities, we did review statistics for twelve campuses. The detailed results of this survey are shown in Exhibit X.² There is a wide range in results, and this range is summarized in the table below.

	<u>Low</u>	<u>High</u>
Instructional space as a percentage of net assignable space	31.3%	47.7%
Hours per week utilization		
Classrooms	11.5	49.7
Laboratories	7.4	38.1
Shops	0.8	60.0

The factors affecting utilization include:

- specialized nature of space
- location of college (large metro area or smaller community)
- local demand for programs, etc.

COLLEGES OF APPLIED ARTS AND TECHNOLOGY IN ONTARIO
 SCHEDULE ON UTILIZATION
OF INSTRUCTIONAL FACILITIES FOR A SAMPLE OF TWELVE CAMPUSES

<u>Twelve Campuses</u>	<u>Instructional Space as a % of Net Assignable</u>	<u>Hours per Week</u>		<u>Shops</u>
		<u>Classrooms</u>	<u>Laboratories</u>	
1	41.5%	25.6	21.2	Ø *
2	31.3	22.4	13.6	9.2
3	43.3	36.5	11.9	8.0
4	47.7	15.6	9.6	Ø *
5	46.0	45.0	27.9	11.8
6	34.0	28.0	10.1	60.0
7	43.0	28.7	18.6	33.3
8	39.9	49.7	12.5	5.0
9	47.0	43.5	38.1	Ø *
10	38.2	18.1	11.6	0.8
11	44.4	11.5	10.6	3.9
12	37.3	28.2	7.4	Ø *

* No space devoted to shop instruction.

Source: Campus Planning Model, Systems Research
 Group Inc., Toronto, Canada.

However, we believe that the statistics do indicate that there could be opportunities for improved utilization within the existing calendar, and that an approach of this type could offer more scope for effecting better use of capital than changing the calendar system to year round operation.

2. Current Evening Activity

Evening programs and classes are a most important part of the activity at Ontario universities and colleges. The evening courses are involving several thousands of adult students in part-time and continuing education programs and thereby providing significant activity on campuses after the normal teaching day.

The Council of Universities of Ontario undertook a survey of Ontario universities in order to make an estimate of facilities utilization. The activities on campuses were measured by way of student head-counts apportioned between the day (8 a.m. - 5 p.m.) and evening (after 5 p.m.).

A summary of the results of this survey, for the period September 15, 1970 to April 30, 1971, is described below.

- a) The undergraduate and graduate student head-count during the daytime was estimated at 118,000, while a comparable head-count after 5 p.m. was about 42,000 or 36% of the daytime count.

- b) There were significant enrolments in non-credit courses during the evening period in the fall and winter.
- c) During the evening period, there are many casual bookings on campuses. Examples of these events include conferences, meetings, dramatic productions, concerts, public interest programs, etc.

The general conclusions drawn from these findings are that University Administrators are making considerable efforts to utilize facilities in the evenings.

Also, there is much public interest in continuing education programs. We understand that certain universities and colleges are taking steps to integrate day and evening curricula so that full-time day students would be attending courses offered in the evening to part-time students. A program of this nature increases the utilization of instructional space over a greater number of hours each day, increases overall class sizes and provides for a more effective use of teaching resources.

3. Summer Term Activity

It is important to mention that virtually all Ontario universities and colleges are mounting summer programs. There are considerable variations in the types of programs, the numbers of students attracted to campus and the lengths of these programs. We have not attempted in any way to survey just how extensive summer activities

are at post-secondary institutions in Ontario. However, a brief presented by Queen's University to the Committee on University Affairs in October, 1971 describes the extent of activity at the University during the spring-summer months (from the end of April until mid-September). The broad range of activities includes the following:

- graduate students and medical students enrolled on a twelve months' basis,
- summer school for students working on under-graduate degrees on a part-time basis or making up courses,
- school teachers attending the Faculty of Education summer sessions,
- conferences and meetings conducted on-campus by outside groups.

The University estimated that during the summer term they served the equivalent of 2,600 full-time students or roughly one-third of full-time fall and winter enrolments.

In their brief, Queen's University officials discussed the extent to which the University's facilities are devoted to non-instructional uses, and the fact that the majority of faculty members remain on campus during the spring and summer months.

Many universities and colleges in Ontario make their facilities available for programs similar to that offered by Queen's. For example, York University offered

5,732 summer registrations largely through Atkinson College, which were equivalent to 1,146 or 11% of full-time fall and winter enrolments. In addition they have an evening program of even greater proportions. Trent University offered 886 summer registrations which were equivalent to 131 full-time students or 7% of normal registration.

One of the major reasons for promoting summer activities is to make better use of ancillary services, such as student residences and dining facilities, and help pay for the fixed costs which continue year round.

4. Summary Position on the Supply of Student Places

We believe that it is quite apparent that there are opportunities for improved utilization in instructional facilities at post-secondary institutions in Ontario. These improvements in utilization can take two forms: first, by making better use of the instructional space available within the existing 'traditional year' academic calendar, and second, by extending the length of the academic year.

If the academic year were extended, some members of the university and college communities could argue that the introduction of year round operations would interfere with, and even cause to be terminated, the important summer term programs for part-time undergraduates and school teachers. However, we believe that it would be possible to operate regular summer terms along with these programs for part-time students. Examples are set by several universities

and colleges in the United States operating year round undergraduate programs as well as offering special summer programs.

An institution that moved to a year round system would be forced to add faculty staff members or have their present faculty accept greater teaching loads. The costs of extra office and research space required to accommodate the additional academics would offset, at least in part, the potential gains from improved utilization of instructional space.

Up to this time, there has been no significant pressure on Ontario universities and colleges to improve the utilization of capital facilities because of the relatively responsive nature of the Province to the institutions' requests for capital funds. In fact, the shortfall from enrolment projections for the 1971-72 academic year suggests that there might be a surplus at this time and therefore no justification to adopt year round operations for the purpose of alleviating the pressure of student numbers.

C. Effect of Year Round Operations on Costs

An extensive part of our research time has been spent on simulating the effects on costs of different year round systems in post-secondary institutions. The simulation or modelling techniques and results are discussed in detail in Chapter VII.

In our simulation model and in other sections of this report we examine the factors which affect academic and non-academic costs including anticipated enrolment growths, current utilization of capital facilities, maintenance of minimum or critical class sizes, repetition of course offerings during the calendar year and imbalance of student registrations by term. We summarize our major findings in the paragraphs below and illustrate some of these conclusions by reference to the actual experience of some post-secondary institutions.

1. Incremental Non-Academic Costs and Capital Costs

In order to achieve a year round operation, certain university or college non-academic departments and ancillary services must extend the length and activity of their operations. For example, under trimester or quarter calendar systems, the work-load in the registrar's and admissions offices is multiplied significantly and the business office must add clerical help to record fees and costs. The costs of maintenance and rehabilitation would increase because of the need to augment the work-force to undertake repairs more expeditiously. Library staffing would be increased. Assuming balanced enrolments by term, ancillary services would have to be staffed on a year round basis resulting in added salary costs.

Therefore, certain non-academic costs would increase with the extension of the academic calendar and the multiple times of entry available to the student. Also, certain fixed costs would be spread over a longer time span.

One of the major fixed costs is the cost of new capital facilities. In our simulation model, we have assumed that new capital facilities would have an annual cost to the institutions as follows:

- an interest cost of 8% each year on borrowings required to finance capital spending;
- an annual charge for depreciation based upon a 30-year amortization of the costs of new capital facilities.

We have also assumed that the extent of capital addition expenditures is a function of the projected enrolments for the Ontario university system from 1971-72 to 1990-91 and the Capital Formula factors used for Ontario universities.

When we compared the additional operating costs with the savings (in buildings not constructed) in amortized capital costs over the 20-year period, we arrived at the following conclusions:

- a) Under a trimester system, in some selected conditions out of several choices that were analysed, the savings in annual amortized capital costs are greater than the increase in non-academic operating

costs - indicating that there could be some economic advantage over a two term or traditional year calendar.

- b) Under a quarter system, in all conditions that were investigated, savings in annual amortized capital costs are less than the increase in non-academic operating costs - indicating that a quarter system would be uneconomic.

Therefore, without taking into account changes in academic costs, the cost benefits of the year round calendar appear marginal based upon current enrolment projections because of the relative size of annual amortized capital costs to total university costs.

2. Academic Costs

Teaching and other instructional costs make up over 60% of total operating costs (not including assisted research) at Ontario universities. The level of academic costs is a direct result of the overall student/staff ratio that can be maintained, which in turn is dependent upon the number of courses offered and the frequency of these offerings.

A change to a year round operation could produce a reduction of class sizes and an increase in the number of under-enrolled classes would result. Academic costs would rise proportionally to the increase in frequency of offerings.

If the original enrolment plus a small incremental enrolment is spread out over more than two terms, requiring the repetition of courses and any significant reductions in course-section enrolments, then both the trimester and quarter calendar systems would be uneconomic. (According to our simulation model, an overall reduction in excess of 6% in course section sizes makes the trimester calendar system uneconomical.)

At this time, the majority of courses are offered only once each academic year at most Ontario universities and although there is no acceptable standard for minimum enrolment, we believe that a study would indicate that there are many under-enrolled courses. To provide students with flexibility there is a need to repeat some courses - and the question of flexibility is examined in a subsequent section of this chapter. To mount a sufficient number of repeat courses for a trimester or quarter calendar system, it may be necessary for an institution to reduce significantly its overall course offerings, cutting back on optional and under-enrolled courses to compensate for the repetition of more popular courses and to maintain an acceptable student/staff ratio.

The experiences of the Universities of Guelph and Pittsburgh illustrate the importance of controlling the numbers of course offerings by term, and the critical section

sizes to sustain an economic trimester program. In Chapter V, we explained how the University of Guelph reduces course offerings in the spring semester to match the reduced enrolments. In contrast, the University of Pittsburgh maintained 70% of its academic staff on a full year's salary to provide students with a wide offering of courses, and yet the summer semester full-time enrolment was less than one-half of the fall and winter semester enrolments. This condition contributed significantly to the University's financial problems.

3. Effect on Capital Costs of Current Utilization

In a previous section of this Chapter, we discussed the availability of student places and the potential for improved utilization of instructional space within the existing seven and one-half or eight month academic calendar. Obviously, if utilization is low in the existing facilities there is unlikely to be any need for new capital facilities. This emphasizes the importance of studying the effective utilization of existing facilities before any institution takes a decision to introduce year round operation or expand its capital plant.

Another important cost consideration is to determine the amount of extra office and research space required to house the additional faculty members needed for year round operation. These additional capital costs could offset in part the savings from extended use of instructional space.

4. The Experience of Simon Fraser University

The only in-depth study we were able to locate on the costs of a university operating on a trimester calendar was carried out by Simon Fraser University.

The study compared the operating costs of the actual three semester academic calendar with the estimated costs of a two semester calendar and a traditional year system to determine the incremental costs of the trimester system. Unit costs were developed relative to student enrolments, contact hours, etc. in order to isolate the costs of repeated and under-enrolled courses. The cost comparisons for the three optional calendars were estimated to be as follows for the 1968-69 academic year for an enrolment of 6,164 full-time equivalent students in each system.

<u>Academic Calendar System</u>	<u>Estimated Cost Per Full-time Equivalent Student</u>	<u>% of Cost of Traditional Year</u>
Traditional Year (Assuming (no under- (enrolled (courses	\$1,980	100%
Two Term	2,010	102
Trimester	2,354	119

Essentially the extra cost for the trimester system is due to the additional cost of instruction in summer courses, and to the additional cost in the fall and spring semesters of

the required flexibility in a trimester system. This flexibility forces many courses to be presented two and three times per year, occasionally with very low enrolments, and therefore greatly increases the cost of instructional contact required to staff the extra courses.

The study showed that the summer enrolments of 2,332 students (full-time equivalent of 1,161) represented 18.6% of the students in the academic year. The incremental cost of this summer curriculum was only 12.3% of the annual cost in the academic departments, and only 8.8% in the operating departments.

The lower incremental cost was due to the fact that all departments had a fixed cost in the summer semester whether or not summer instruction was carried out. (This fixed cost did not include the extra faculty or teaching assistants required for the summer semester). The fixed portion of the summer semester costs amounted to 54% of total summer semester costs in the academic departments and 67% in the operating departments for 59% of the total University.

Thus, if the fall and spring semesters had been offered, without modification, for the 5,003 full-time equivalent (F.T.E.) students, and there had been no summer instruction, the total cost would have been \$12,985,000 or \$2,580 per F.T.E. student. The offering of courses in

the summer semester allowed 1,161 F.T.E. students to be added at an incremental cost of \$1,314 per F.T.E. student. This then improved the academic year costs to yield a cost of \$14,511,000 on behalf of 6,164 F.T.E. students, or \$2,354 per F.T.E. student.

It was also estimated that students could have been added to the fall and spring semesters at a still better unit cost of \$782 per F.T.E. student and clearly there is a greater gain in adding students to these semesters. Because of the high fixed costs and substantial enrolment base of over 2,000 students (50% of fall enrolment), there is a gain from adding students to the summer semester when compared to not having a summer semester.

The Woods, Gordon report recommended that attention be focused not on the incremental cost of offering summer courses but on the high cost incurred in underenrolled and repeated courses in all semesters. At present the university is examining ways to retain the advantages of the trimester operation while reducing the above costs.

5. Costs of Conversion

A conversion to a year round calendar (such as the trimester or quarter systems) would involve significant restructuring of virtually all aspects of university or college operation. The need for reorganization and restructuring would involve at least the following:

- a) Curriculum would have to be restructured, and many courses revised in order to change to the new term length. These activities would require extensive time and effort from faculty members, department chairmen and deans.
- b) The re-definition of pre-requisite and co-requisite courses would be required plus the rescheduling of courses into appropriate sequential timetabling. The rescheduling of staff time would require some major changes.
- c) Records in the registrar's and bursar's office would have to be changed. Significant changes in systems design and computer programs would be required, meaning a direct out-of-pocket cost to the university or college. This cost could be substantial.
- d) Library systems and methods would have to be revised to meet year round requirements.
- e) The planning and particularly the staffing of ancillary services, such as residences and dining facilities, would require reorganization.

In summary, the whole university would have to be geared to a new level of activity and these changes could be brought about only after an extended period of time for planning and reorganization.

6. Summary

The writing and comments, by people who are proponents of a year round academic calendar, emphasize the significant savings that could be achieved by way of reduced capital costs and the spreading of fixed costs over a longer period. Our findings, both from examining the experience of others and the results of our simulation model, indicate conclusively that the economies from year round operations would be marginal. These savings would be realized only with the introduction of very close controls over course offerings, and more probably, fairly severe restrictions over the offering of new courses and elimination of under-enrolled courses. Also, the probability of achieving balanced enrolments by term seems very remote.

In our opinion, to consider the further introduction of year round operation on a moderate or large scale in Ontario would not make economic sense at this time. We believe that there are numerous other opportunities to increase the supply of student places at a more reasonable cost. Extension of the two term system is favoured by us. Unless the Province and the institutions themselves were prepared to exercise close controls over the many factors affecting costs on introduction of a year round calendar, it could be more desirable to continue capital spending to meet the demand for student places. Our major concern is

that any 'slack' in the fall and winter terms be used up at a relatively low incremental cost before students and faculty are disrupted with a forced summer semester operation.

D. A Longer Year University Term

We have commented earlier on the reported low utilization of instructional space and the potential for improvements by expanding the teaching day and week. Presumably after making improvements in utilization within the existing academic calendar, by better planning, scheduling and the enforcement of classroom and laboratory utilization during the less desirable times of the day and week, the next step is to extend the length of the academic calendar year.

Some researchers and writers have commented that an extended academic calendar using a two term system would be the most logical approach in providing additional student places and increasing overall utilization of university and college plant facilities.

In our opinion, an extended two term academic calendar would be the most logical choice in calendar systems to consider for the post-secondary system in Ontario. This academic calendar would take the form of two five-month terms for a total of 10 months compared to the current seven and one-half months calendar year. As a result, an undergraduate in a four year program would complete 30 months on

campus in three years compared to the current 30 months over a period of four years.

Converted to weeks, the calendar would run as follows:

<u>Term 1</u>	<u>Weeks</u>
First week of September to first week of February with a one week break for the Christmas holiday period	20
<u>Term 2</u>	
Third week of February to the last week of June	<u>20</u>
Total	<u>40</u>

This calendar provides a one-third increase in classroom instruction time, compared to the existing calendar which varies from 27 to 32 weeks depending on the institution. This system would be comparable to the popular two semester calendar system used by American institutions except that the terms would be longer. Each term would be an integral unit with registration and examination periods - or two registrations and sets of examinations in each year. This would provide students with the flexibility of entering the system either in September or February. Also, a student could miss a term for financial or other reasons if he did not wish to accelerate or was unable to do so. Two months would be available to the institution in the summer to offer eight week summer school sessions for teachers, part-

time students and students requiring 'make-up' courses. Many of the factors considered as disadvantages respecting the trimester and quarter systems would no longer be a concern to students, faculty and members of the administrations. Some of the major advantages of a two term calendar are examined and compared with the potential disadvantages of the trimester and quarter systems in the following paragraphs.

a) Acceleration of Student Program

The students would be given the flexibility to accelerate under the two term system. The students would have a ten week break annually to recover from the pressures of the extended terms.

b) The Students' Finances

The student could accelerate and take advantage of the financial rewards earned from earlier graduation. The two term calendar would give the student the flexibility to leave campus for a period of seven months to accept temporary employment and earn the income needed to finance the next one or two terms. Under the existing 'linked year' calendar, the student may have to miss a full year if he is unable to earn adequate income during the four or five months break.

c) Curriculum Duration and Restructuring

The student could take missed subjects in the following term rather than taking a whole year to make up

failures and change course selections. There would also be less concern and adjustment over the effect of the compression of course materials. This is considered to be a major problem with the shortened terms under trimester and quarter systems.

d) Reduced Curriculum Choice

We have discussed in other sections of this report the need to reduce the numbers of course offerings in the spring and/or summer terms of trimester and quarter systems because of significantly reduced enrolments in these terms. With a two term system, enrolments would be balanced in each of the two terms and the curriculum would be repeated primarily for high-demand courses.

e) Tradition of Calendar Pattern

We have discussed in earlier chapters the problems of moving from the traditional calendar pattern with its four months break, to a trimester or quarter system. Large numbers of students would be on campus during the summer months, and it would require many years to change attitudes and bring this about. The two term system would co-ordinate very well with the high school calendar (alleviating any admission problems for freshmen) and would not conflict with the attitudes of students, faculty,

parents and employers towards the need for a summer vacation period.

f) Students' Extra-Curricular Life

The concern about lack of continuity within the student body with trimester or quarter systems should not be a problem with the majority likely attending both terms of a two term system.

g) Faculty Time for Research and Study

As indicated in an earlier chapter, academics have strong feelings with respect to allocation of their time between their teaching responsibilities and research and study. The introduction of a two term academic calendar extending over a period of ten months would increase faculty teaching loads and reduce the amount of free time for other pursuits. Faculty could be compensated for this increased time involvement by increasing the frequency of sabbatical leaves or giving them a term off every second or third year. Such an approach would provide faculty members with the opportunity to undertake extended research projects, consulting assignments or trips to universities in other parts of the world.

A less costly approach would be to alter slightly the current commitment to research and teaching. A clear definition of the objectives of research and

teaching by the Department of Colleges and Universities, and by the individual institutions might raise the priority on teaching and accomplish a greater teaching contact at the expense of research or some other academic activity.

h) Faculty Income Potential

If the faculty were asked to extend their annual teaching commitment by two and one-half months, there would be the question of additional salaries. Rather than increase salary levels, we believe that it would be more desirable to compensate by allowing terms off or additional sabbatical leaves as suggested above. Opportunities to earn extra income from summer teaching assignments would be as available as under the current system.

Some of the potential disadvantages that would have to be considered with the adoption of an extended two term system would include at least the following:

- a) If the majority of students took up the opportunity to accelerate, the increased financial student assistance could become a significant cost to governments.
- b) Curriculum would have to be revised to fit a new time frame.
- c) Many students would experience difficulty in finding work for only a two months summer period.

- d) Faculty members would object to the possibility of increased teaching loads over an extended period of time.
- e) The introduction of a two term system might require the addition of staff with the resulting capital requirement for more office space and research facilities on campus.

In summary, we believe that a two term system, with an academic calendar extended to ten months in each year, would provide the opportunities for improving the utilization of facilities. A large scale shift to the trimester or quarter academic calendars would take many years, requiring changes in the attitudes of everyone concerned. The adoption of the two term calendar could be achieved much more readily since students, accustomed to the high school calendar, should be prepared to accept the proposed calendar system.

In our opinion, a change to a two term calendar system could provide a more probable return in reduced educational costs than could be expected from either the trimester or quarter systems.

Before any significant steps can be taken to revise the academic calendars used by the majority of institutions, we believe that there is a real need to re-evaluate the costs and benefits of the entire post-secondary

system in Ontario. Not only is there the need to examine better utilization of the teaching days and weeks; in addition, there is the whole question of examining teacher 'contact load'. At this time, about 60% of the total operating costs of universities (excluding assisted research) is spent on instructional costs. Recognizing this fact raises the question of whether or not the system can afford to have faculty members teaching six to eight hours per week for less than 30 weeks in each year. In our opinion, it would be more desirable to increase teaching loads within the existing calendar length before considering extension of the terms. For example, an overall 15% increase in course loads would improve total efficiency by about 10%. Increasing the teaching load would eliminate the problems of re-organizing curriculum to meet a new time frame, and would be generally much less upsetting to the whole system. An examination must be made of the allocation of resources to teaching and research functions, and the benefits derived therefrom, before the Province can afford to consider any significant changes in the academic calendar which may serve only to further escalate the growth rate in the costs of higher education.

E. Flexibility in Curriculum Offerings

If a university or college introduces a trimester or quarter calendar system, one of the problems to be

considered is the flexibility or freedom of choice allowed to students in course offerings each term. At a time when many institutions either have expanded or are expanding the number of courses available to students in degree and certificate programs, any reduction in choice would seem to be obtuse to the present day philosophy on the subject. We are not in a position to determine whether a student would be better off with more or less choice of curriculum.

If we use the experience of the University of Guelph as an example, they have found it necessary to reduce the number of course-sections offered in the spring term in order to maintain economic class sizes. The statistical results prepared from their timetable indicate that only 16% of their courses are offered in each of the three semesters. Therefore, students entering spring semesters or summer quarters at most institutions are provided with only a limited selection of courses and may have to accept substitute courses or take the desired course after waiting one or two terms because the demand may be low.

The results of our simulation model indicate that maintaining course-section or class sizes at a minimum is critical to the economics of a year round operation. For any institution switching to a year round operation, it is imperative to control class sizes if costs are to be

less than, or equal to, the total costs of the traditional year academic calendar system. The majority of courses offered at Ontario universities are in single sections; in other words, one class of students takes a given course each year. Therefore, if a change to year round operation makes it necessary to repeat the course without any increase in enrolment, class sizes drop and the student/staff ratio declines, resulting in uneconomical operation of the year round alternative.

Therefore, the more students attracted to an institution because of year round operation, the more opportunity there is to repeat courses and provided added flexibility. However, the experience of most institutions visited to date indicate that the anticipated increases in enrolment have not materialized. The result is a reduction in the number of courses offered each term and an increasing incidence of substitute courses for the students.

F. Potential Government Programs or Pressure
that Might Encourage Students to Extend
Their School Year

A discussion on programs or pressure presupposes that many of the general obstacles and objections outlined in this report have been overcome or constrained. By this we mean that satisfactory faculty salaries have been negotiated, a complete curriculum is offered, a reasonable

registration is possible (say at least in the 40% to 50% range of total fall registration), and that teaching and dormitory space is air-conditioned or generally comfortable in warm weather. Some of these matters could be considered as programs, but our concern is more directly associated with the students and the incentives to encourage them to enrol in a spring semester.

One of the prime concerns is the matter of timing. Spring semester normally begins in late April with a one or two week holiday in late August. High school Grade XII and Grade XIII programs normally run into June. To attract students, particularly those with no job commitment for the summer or those who are keen to continue their education, some compromise should be worked out so that a student could graduate from secondary school and enter the spring semester term immediately. A more intensified high school course or an earlier start in the last year of high school might be considered.

The value of financial incentives is difficult to appraise. In American colleges, already using the year round plan, a higher than normal attendance at spring-summer sessions was found among keen (middle or lower class) students anxious to accelerate their courses, as well as among more adult or mature students. Financial incentives other than an extended loan program would not greatly

increase the registration of this dedicated type of student. (Extended loans, in this case, would apply only to students attending three consecutive semesters and would be repaid after graduation). One possible financial incentive might be a reduction of 10% or more in accommodation charges. If necessary, this reduction could be justified by the lack of heating expense. Some subsidization of food costs may be necessary due to a reduced volume of service, but this would not affect the students. Their food costs would remain unchanged.

If there were a scholarship program, some financial incentive could be incorporated in the terms which would require attendance at some spring-summer terms, or would offer a premium for speeding up the student's course.

Basically, we do not believe that general subsidization or aiding of students other than by the methods suggested above would have much effect in extending the student's school year or promoting the spring term. Students are accustomed to taking summer employment and going to school in the fall and winter. This is a great "folklore" that is difficult to break down, particularly in a conservative student population. Those students who must earn money to attend college are not a problem in the year round college. Instead of competing with large numbers of other students for summer employment, they may find it better

to attend the spring-summer term and work during some other term when the competition is less and the pay possibly better. But those students who are not compelled to work cannot generally be persuaded by direct financial incentives to lengthen their school year or take the spring-summer term.

To change this pattern or "folklore" of a summer break may prompt some programs that would make the spring-summer term more attractive to the student. This could take many forms. Smaller classes and a better teacher-student ratio could exist until the trimester or quarter was fully accepted and the spring-summer term as well attended as the other terms. A formal program of visiting lecturers might be underwritten. Similarly, visiting drama groups or important musicians could be asked to perform. In other words, a little more emphasis on cultural behaviour could be promoted in the spring term to replace the normal level of college sports, dances, and other fall and winter activities. Inter-collegiate sports would not be started, but seasonal intermural sports would continue.

Probably the most effective program would be to mount a well-planned public relations project to sell the advantages of a year round system and of attending the spring-summer term to the student. This promotional project, assisted by the difficulty of finding summer

employment, would make the alternative of a good stimulating summer term most attractive.

In summary, students will only balance out with near-equal enrolments over three or four terms in a year, if the academic program is built on that premise. Such is the case in the year round co-operative education programs, and the year round medical school. Otherwise, given their own free choice, students will avoid July and August at college. Strict ceilings in other terms may cause some small shift from this pattern in order to gain admittance. The new problems of selection that would be caused by such ceilings would not be justified by the slight shift in registration.

G. Effect of Year Round Operation on the Work Force

Because we are in a period of relatively high unemployment which has received a considerable amount of interest from the public, politicians and the press, the potential effects on the labour force of revising the calendars of post-secondary institutions is a topical matter. Furthermore, the Federal Government has statistics which show that a disproportionate contribution to the national unemployment situation is made by young people in the 14-24 age group. The results of a Statistics Canada 'Labour Force Survey' by age group for 1970, shown in the table below, provide a good example of this situation.

<u>Age Groups</u>	<u>Percentage Unemployed by Age-Sex Breakdown in Canada for 1970</u>	
	<u>Males</u>	<u>Females</u>
14-19	15.0%	11.4%
20-24	10.5	5.1
25-34	5.3	3.2
35-44	4.6	3.0
All	6.0	4.5

In summary, young workers in the 14-24 age group experience rates of unemployment one and a half to three times greater than workers in the 25-54 age group.³

The young people in the labour market can be characterized as follows:

- a) juveniles who have left school at an early age and make up a large part of the permanent work force;
- b) students who have dropped out of post-secondary institutions before graduation and make up part of the permanent work force;
- c) students attending post-secondary institutions and seeking temporary employment during the summer months;
- d) young people who have graduated from post-secondary institutions and are seeking permanent employment.

Revisions to the academic calendar systems would have the most effect upon the employment opportunities of the last two groups of young people.

Of particular interest are the results of a Statistics Canada Study which show that the unemployment

rates were much lower for young people seeking temporary summer employment than for young people who left school and are members of the permanent work force. This would suggest that finding summer employment for students may not be as serious a problem as sometimes suggested. However, a change either by several or all post-secondary institutions in Ontario could have a significant impact upon the labour supply market for temporary and permanent positions.

Theoretically, by moving to year round operation of post-secondary institutions, and assuming that all students accelerated their educational programs, the labour force supply available for summer employment would be reduced and demand for permanent positions increased, both rather significantly. In order to quantify this effect,-- the enrolments in each of the four years of normal baccalaureate programs at Ontario universities is shown in the table below.

STUDENT ENROLMENTS BY YEAR FOR
ONTARIO UNIVERSITIES

	Year 1 (Freshmen)	Year 2 (Sophomore)	Year 3 (Junior)	Year 4 (Senior)	Total
1968-69	26,419	19,763	16,768	6,632	69,582
1969-70	29,760	23,558	18,947	8,128	80,393
1970-71	31,642	25,868	22,307	10,116	89,933

- Notes: 1. Includes those undergraduates in extended professional programs such as dentistry and architecture.
2. Adjusted for trimester programs at Guelph and Waterloo.

The above figures indicate that if all students took up the opportunity to accelerate, over 10,000 graduates would enter the work force at an early stage. The results of studies prepared by the Department of Manpower and Immigration indicate that, during recent years, the increase in the supply of graduates has tended to exceed the growth in suitable employment opportunities in many fields. If this trend continues, it may not be appropriate during the next few years to increase the supply of graduates by reducing their length of time in school, and thereby aggravate an already competitive situation.

In our opinion, the introduction of a year round academic calendar, either at selected or all post-secondary institutions, would not have an immediate impact upon labour force patterns, since the majority of students would not be prepared to change their existing patterns of on-campus attendance in the fall and winter terms, a factor that we have considered in some detail in other chapters of this report. Therefore, the actual effects on the available labour force would be far different from what could happen if all students took up the opportunity to remain on campus year-round and accelerate their degree programs. We believe that it would take a period of several years to accomplish any significant change in the attitudes of students.

If flexibility were added to the post-secondary education system by moving to a trimester, quarter or some other extended year system, over a period of time many students might take advantage of the ability to move freely between school and the labour force depending upon their financial circumstances and the demand for temporary labour. For example, a student might work for a period of six or eight months over the fall and winter and then return to the campus for an extended period of time. If a large number of students opted for work periods other than during spring and summer, there would be a more even distribution all year in the supply of students looking for temporary work situations.

If the academic year were extended from the normal seven to eight months to, say, nine or 10 months, the time away from campus would be shortened considerably and more students would use the off-campus term for vacation purposes - again reducing the supply of temporary labour.

If several institutions adopted the co-operative or work-study education format, the student labour force would be affected as follows:

- a) There would be a more even distribution of students entering the labour market during the course of a year.

b) Less time would be wasted by students (and employers) in finding employment positions. After an employer had agreed to accept students, it is likely that one employment position could serve two or more students for the length of their university training. Offsetting the benefits of such a program are the costs of co-ordinating it, which must be borne by the institutions.

Generally, a co-operative program delays graduation by one year, thereby postponing temporarily the number of graduates entering the permanent labour force.

Footnotes:

- ¹ Porter, Blishen (et al). Toward 2000: The Future of Post-Secondary Education in Ontario, Toronto: McClelland and Stewart, 1971. Page 54.
- ² Source: Systems Research Group Inc. Campus Planning Model, Colleges of Applied Arts and Technology in Ontario, 1971.
- ³ Department of Manpower and Immigration, Government of Canada; New University Graduate, Supply and Demand 1970, Page 11.

CHAPTER VII - DEFINITION OF MODEL, RESULTS AND CONCLUSIONS

A. Model Description

1. General

Due to the difficulty in obtaining data for a particular university, the computer model developed in this study is a parametric one. That is, key input variables are assigned different values and the sensitivity of the output to these changes is observed. In addition, cost relationships are built into the model as determined from aggregate cost figures (Statistics Canada, Department of Colleges and Universities of Ontario), and from Simon Fraser University. The latter was chosen because of its experience with the trimester program and because detailed cost figures were readily available from a previous Woods, Gordon & Co. study. The purpose of the model developed at this stage for the Commission has been to demonstrate its value as a tool for planning and decision-making purposes. While the conclusions arrived at here as a result of the model runs could be used as guidelines in a very general sense, they should in no way be applied to a specific university in the Ontario system.

The model uses a total cost approach in comparing academic calendar year alternatives. Total costs over a 20 year period (1971-1990) are calculated for each year for each academic calendar alternative at changing levels of

term enrolments. These costs are discounted and the present value is compared against the discounted cost for the standard two term program.

The critical parameter in this analysis was chosen to be section sizes (class size). This was because experience at other universities has indicated that the success of trimester or quarter operation depends on balancing off the increase in operating costs by the savings in capital costs with these plans. The high operating cost results primarily from the decision to maintain a full course offering in the face of lower term enrolments, particularly in the summer term. If a university operating a standard program has the majority of its courses offered in multiple sections, this increase in operating costs will not be great. However, if the majority of a university's course offerings are given in one section only, many new sections will have to be opened and, with the same general level of overall enrolment, the section sizes will be reduced in switching to a quarter or trimester plan. It then becomes of interest to determine what mean value of section size will make the discounted cost of the standard program and the alternative under consideration equal. These section size values at the break-even point are referred to as the critical section sizes.

The critical section size values are directly dependent on the saving in capital costs minus the increase in operating costs for the year round alternative under consideration. This is because the difference is converted into a section size reduction to the critical value if the result is positive and an increase in section size if the result is negative.

If the difference is exactly zero, then the critical section sizes are the section sizes present in the standard program and the indication is that there is a fair trade-off between the savings in capital costs and increase in operating costs. Hence, nothing is to be gained economically in switching to year round operation.

2. Academic Policy Implications of Model Results

The policy implications of this analysis are that the university must regulate its course offerings for the trimester or quarter plan so that the resulting mean section sizes are equal to, or greater than, the critical values. Course offerings for the year round alternative which result in section sizes less than the critical values indicate uneconomical operation.

In predicting whether an institution could maintain mean section sizes at the critical values if it switched to a year round alternative, the academic policy-makers would have to determine the number of repeated sections for each

course offering under its present system. It could then be possible to determine the extent of adjustments in course offerings necessary to maintain the critical section sizes under the new plan. For example, if an institution were operating under a standard two term plan and each course were offered three times (in three sections) then switching to a trimester plan would not result in a decrease in section sizes and no increase in instruction costs would be incurred.

If each course in the standard program were offered in a single section and it was decided to switch to trimester operation, then instruction costs would triple with a complementary reduction in mean section sizes to one-third their original level. If these section size values were below the critical values calculated in the model, the only choice left would be to drop courses to increase section sizes to at least the critical values.

3. Calculation of Student Enrolments

The first step in the computer modelling of each alternative for year round operation of post-secondary educational facilities was to develop a projection of the number of students enrolled in each academic level in each term of every year from 1971 to 1990 inclusive. The numerical values of the student enrolments by level, term, and year were used as the basis for all subsequent calculations of operational and capital costs.

The number of students in each level, term and year depends upon the following factors:

a) The Retention Rates from the Freshman Level

By retention rate is meant, the effective proportion of freshmen who eventually advance to each of the higher academic levels. There is one retention factor corresponding to each level. For example, if 88% of a freshman class advances to the second academic level, 80% to the third level and 36% to the fourth, the retention rates would be as follows:

TABLE 1

<u>Level</u>	<u>Retention Rate</u>
1	1.00
2	.88
3	.80
4	.36

If an operating schedule is such that students spend more than one term in each academic level, then there are retention rate values that apply to the terms within each level. For example:

TABLE 2

<u>Level</u>	<u>Retention Rate</u>	
	<u>Term 1</u>	<u>Term 2</u>
1	1.00	.90
2	.88	.84
3	.80	.78
4	.36	.35

b) The Schedule of Attendance

Each of the alternative operating programs has a unique schedule of attendance which defines the program and affects the values of student enrolments. For example, a trimester program in which students attend classes for two consecutive terms, then vacation for one term, results in different enrolments in each level, term, and year compared to a trimester program in which students attend for three consecutive terms before vacationing. The student enrolment in a specific level, term, and year is equal to the freshman enrolment of one of the previous years factored down by the appropriate retention rate. The schedule of attendance defines exactly which freshman enrolment value and which retention rate must be used.

c) The Number of Registrations Per Calendar Year

In a year round operating program there may be one or several registrations per year, the maximum practical number being one at the beginning of each term. There is a separate schedule of attendance which begins with each registration session in the first academic level, and consequently there are several schedules of attendance or streams within the operating program each beginning at a registration

session. The number of streams within an operating program is equal to the number of freshman registration sessions per year. The total student enrolment in any level, term and year is equal to the sum of the corresponding enrolment in each of the attendance streams. The number of students enrolled in each stream depends on the split or level of imbalance of the total enrolment between the multiple registrations.

The concept of attendance streams is shown in Exhibit XI for a trimester system in which students are in attendance for two consecutive terms, then are off for one term, and in which there are two registration sessions per year. Attendance stream 1 begins in the upper left-hand corner of the table. It can be seen by moving to the right that for every 1.000 freshmen who register in term 1 for the first time there are .900 freshmen remaining in stream 1 in term 2. Similarly on the second line of the table (stream 2), it can be seen that for every 1.000 freshmen who register in term 2 for the first time there are 0.900 freshmen remaining in stream 2 in term 3. In order to arrive at the total freshman enrolment in any term one must add together the enrolments in each of the streams. For example, the total freshman enrolment in term 2 is equal to 0.900 of the freshmen who registered for the first time in term 1 plus 1.000 of the freshmen who

-INTERMEDIATE VALUES FOR THIS ALTERNATIVE

1. ATTENDANCE MATRIX

YEAR	0	0	0	0	-1	-1	-1	-1	-1	-2	-2	-2	-2	-3	-3	-3	-3	-4	-4	-4
TERM	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

LEVEL STREAM

1	1	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1	2	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1	3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	1	.000	.000	.000	.000	.890	.841	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	2	.000	.000	.000	.000	.000	.890	.841	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	1	.000	.000	.000	.000	.000	.000	.000	.801	.776	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	2	.000	.000	.000	.000	.000	.000	.000	.000	.801	.776	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.360	.354	.000	.000	.000	.000	.000	.000
4	2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.360	.354	.000	.000	.000	.000	.000
4	3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

registered for the first time in term 2. In a similar fashion, the sophomore enrolment in each stream is shown on the fifth and sixth lines of the table to the right of "Level 2" and under "Year-1" which denotes that these factors must be multiplied against the number of freshmen who registered for the first time in the year previous to the current year. Again, the total sophomore enrolment in any term is equal to the sum of the sophomore enrolments in each of the streams. For example, the total sophomore enrolment in term 2 is equal to .841 of the freshmen who registered for the first time in term 1 of the previous year plus .890 of the freshmen who registered for the first time in term 2 of the previous year. The enrolments in levels 3 and 4 are shown in similar fashion in the bottom half of the table under "Year-2" and "Year-3".

Once the above information is known, the alternate program for year round operation is completely specified and it is possible to model student enrolments from a projection of freshman registrations in each year of the study. For example, the student enrolment in each term of 1971 for the standard semester system with one registration and retention rates as specified in table 2 can be calculated as follows:

$E(I, J)$ = enrolment in term I, level J for 1971

$F(N)$ = number of freshman registrants in year N

$$E(1, 1) = 1.00 * F(71)$$

$$E(1, 2) = .88 * F(70)$$

$$E(1, 3) = .36 * F(69)$$

$$E(1, 4) = .36 * F(68)$$

$$\text{Total enrolment in term 1, 1971} = 1.00 * F(71) + .88 * F(70) + .80 * F(69) + .36 * F(68)$$

$$E(2, 1) = .90 * F(71)$$

$$E(2, 2) = .84 * F(70)$$

$$E(2, 3) = .78 * F(69)$$

$$E(2, 4) = .35 * F(68)$$

$$\text{Total enrolment in term 2, 1971} = .90 * F(71) + .84 * F(70) + .78 * F(69) + .35 * F(68)$$

A similar set of equations was constructed for each year of each alternative program. As a further example, the enrolment equations for 1971 have been included below for a trimester system with a two term on, one term off, repetitive pattern with three registrations each year. The equations depend upon the proportion of the total enrolment that enters at each registration. For this example, the split was assumed to be .80, .10, .10. It was necessary to develop a similar set of equations for every such level of imbalance in student registrations.

TABLE 3

ENROLMENT EQUATIONS FOR 1971 OF
A TRIMESTER SYSTEM

- 2 terms on, 1 term off
- 3 registration/year
- registration imbalance .80, .10, .10
- retention rates as per table 2

$$E(1, 1) = .800 * F(71) + .090 * F(70)$$

$$E(1, 2) = .712 * F(70) + .084 * F(69)$$

$$E(1, 3) = .640 * F(69) + .078 * F(68)$$

$$E(1, 4) = .288 * F(68) + .035 * F(67)$$

$$E(2, 1) = .720 * F(71) + .100 * F(71)$$

$$E(2, 2) = .673 * F(70) + .089 * F(70)$$

$$E(2, 3) = .621 * F(69) + .080 * F(69)$$

$$E(2, 4) = .283 * F(68) + .036 * F(68)$$

$$E(3, 1) = .090 * F(71) + .100 * F(71)$$

$$E(3, 2) = .084 * F(70) + .089 * F(70)$$

$$E(3, 3) = .078 * F(69) + .080 * F(69)$$

$$E(3, 4) = .035 * F(68) + .036 * F(68)$$

In the actual computerized model that was developed, full use was made of matrix algebra in order to construct the large number of equations that had to be examined for every combination of retention rates, schedule of attendance, and imbalance level between multiple registrations. A listing and one full set of output for this program has been included in Appendix C* to this report

*Under separate cover.

in order to demonstrate the method of analysis in detail for those who are interested.

The source of the projection of freshman registrants by year from 1971 to 1990 has been discussed in Chapter VI, section A, of this report. The projection of student enrolments, which was stated in terms of a forecast of total enrolment in all academic levels by year, was worked backwards through the standard semester system using retention rates that express the average experience in Ontario from 1969 to 1971 in order to derive a projection of freshman registrants by year from 1971 to 1990. Rather than deal with the absolute values of freshman registrants, which would result in very large values of enrolments and costs in each year of the study, it was decided to normalize the projection of freshman registrants by dividing the projection for each year by the value of freshman registrants in 1971. Consequently all subsequent enrolment projections and costs may be thought of as the values that would be generated by each freshman registrant in 1971. In order to convert any enrolment projection, teacher requirement or cost into absolute figures one must multiply by the absolute value of 1971 freshman registrants.

4. Calculation of Teacher Requirements

Once the student enrolment in each level, term and year had been projected for an operating program, it

was possible to determine the required teaching staff according to the following equation:

$$\# \text{ teachers required} = \frac{(\text{student enrolment projection}) * (\text{student course load})}{(\text{section size}) * (\text{faculty teaching load})}$$

In the above relationship between teachers and student enrolments, provision was made for student course load and faculty teaching load to vary with the academic level. In the case of section size, provision was made for variation with both academic level and term.

The following table indicates the way in which the total teacher requirements were calculated for each term of each year from 1971 to 1990.

TABLE 4

NUMBER OF TEACHERS REQUIRED IN 1971 FOR THE STANDARD SEMESTER SYSTEM WITH ONE REGISTRATION AND RETENTION RATES AS IN TABLE 2

<u>Term</u>	<u>Academic Level</u>	<u>Normalized Student Enrolment</u>	<u>Student Course Load</u>	<u>Section Size</u>	<u>Faculty Teaching Load</u>	<u>Required Number of Teachers</u>
1	1	1.0000	5	33	3	.0505
1	2	.7932	5	24	3	.0551
1	3	.6592	5	22	3	.0499
1	4	.2526	5	21	3	.0200
Total number of teachers required in term 1 =						.1755
2	1	.9000	5	33	3	.0455
2	2	.7495	5	24	3	.0521
2	3	.6395	5	22	3	.0484
2	4	.2484	5	21	3	.0197
Total number of teachers required in term 2 =						.1657

5. Calculation of Capital Costs

The unit used to measure plant capacity and required plant additions in each year was the number of students that could be serviced by the plant under normal operating conditions. In order to arrive at a starting value of plant capacity, it was necessary to define a utilization factor equal to the proportion of the total plant capacity that the 1971 total student enrolment at all levels represents under normal operating conditions and time-tables. Utilization values of .60, .75, and .90 were used in the analysis to test the effects of this variable. The available plant capacity in 1971 was calculated to be the 1971 first term total enrolment under the standard semester system divided by the utilization factor.

In each year of study for each alternative program, the term and value of maximum term enrolment at all levels were identified. If the value of maximum term enrolment was greater than the available plant capacity in any year, a plant addition was made sufficient to bring the plant capacity into line with the maximum enrolment. The cost of capital additions in dollars was calculated by use of the equation below.

$$\text{Cost of Capital} = \frac{\text{Addition in Student Capacity}}{\text{Addition}} * (\text{Net Assignable Square Feet/Student})$$

*Construction Cost/Square Foot.

The following were used as values of the parameters in the above equation:

net assignable square feet/student = 105 and 130
construction cost/square foot = \$55.

The above figures are based on the Interim Capital Formula for Ontario Grants and discussions with Government officials.

The cost of capital additions in any year was amortized over thirty equal annual payments at an effective annual interest rate of 8.0%. Any costs which were to be repaid after the end of the twenty year period were discounted back to the end of year 1990 at the discount rate used for all costs, which was 7.5%. After the simulation of all capital additions in the twenty year horizon of the model was completed for an alternative, the total value of capital costs in each year was calculated by adding the repayments of all previous plant additions which occurred in that year. The capital repayments of individual plant additions and the total capital cost in each year are displayed as a table in the output of the computer model and may be referred to in Appendix C* to this report. The payment displayed in 1990 represents the actual cost in 1990 plus the discounted value at the end of 1990 of all future capital repayment costs that occur after the end of the simulation horizon.

*Under separate cover.

6. Calculation of Annual Operating Costs and Annual Total Costs

The operating costs in the model can be broken into two major categories. These are base operating costs and incremental operating costs. Base operating costs are those operating costs that would be incurred for a standard two term program, whereas incremental operating costs are the incremental costs incurred in all operating cost categories because of any extension in length of operation in the calendar year for the alternative being considered.

The base operating costs in the model are derived using Statistics Canada data (Canadian Universities, Income and Expenditure - Catalogue No. 81-212) for the Province of Ontario. Base operating cost ratios were determined using this data and from these ratios base operating costs are calculated by category in the model. The operating cost ratios used in the model are as follows:

<u>Operating Cost Category</u>	<u>Ratio to Total Operating Costs Excluding Assisted Research</u>
Instruction	.623
Library	.085
Administration	.074
Plant Maintenance	.120
Other	<u>.098</u>
	<u>1.000</u>

The cost categories are as defined in the aforementioned Statistics Canada catalogue. The model calculates the instructional cost based on the number of teachers required for the alternative. The total base operating cost per year as well as the remaining operating costs per category are calculated by using the above ratios. This total base operating cost per year is calculated for all academic year alternatives. To these costs the incremental operating costs are added, the amount depending on the academic alternative being considered, its increase in length of operation and the term enrolments.

These cost increments are calculated in each of the categories according to the following two formulae:

$$\begin{aligned}
 & \begin{array}{l} (1) \text{ Increment in } \\ \text{Library} \\ \text{Plant Maintenance} \\ \text{Other Costs} \end{array} = \begin{array}{l} \text{Base} \\ \text{Cost} \end{array} \times \begin{array}{l} \text{Percentage of} \\ \text{Base Cost} \\ \text{that is Affected} \\ \text{by Extended Year} \\ \text{Operation} \end{array} \times \begin{array}{l} \text{Increment in} \\ \text{Year Length} \\ \text{Standard Year} \\ \text{Length} \end{array} \\
 & \qquad \qquad \qquad \times \frac{\text{Summer Enrolment}}{\text{Balanced Term Enrolment}} \\
 & \begin{array}{l} (2) \text{ Increment in } \\ \text{Administration} \\ \text{Costs} \end{array} = \begin{array}{l} \text{Base} \\ \text{Cost} \end{array} \times \begin{array}{l} \text{Percentage of} \\ \text{Base Cost that is} \\ \text{Affected by} \\ \text{Extended Year} \\ \text{Operation} \end{array} \\
 & \times \left[\frac{\text{Enrolment in the First Term with an Added Registration}}{\text{Balanced Term Enrolment}} \right. \\
 & + \frac{\text{Enrolment in the Second Term with an Added Registration}}{\text{Balanced Term Enrolment}} \\
 & + \dots \left. \right]
 \end{aligned}$$

The percentage of the base operating costs that is affected by extended year operation was determined from the study of trimester calendar costs at Simon Fraser University made by Woods, Gordon & Co. It was then hypothesized what variable(s) would most affect these costs. The percentages and the identified variables are shown in the following table:

Operating Cost Category	Percentage of Cost Category that is Affected by Year Round Operation	Primary Variable Cost Affecting Increment	Secondary Variable Affecting Cost Increment
Library	9.0	Increment in Year Length	Summer Enrolment <u>Balanced Term Enrolment</u>
Administration	14.0	Increase in the Number of Student Registrations	Enrolments in Terms of Added Registrations <u>Balanced Term Enrolment</u>
Plant	42.0	Increase in Year Length	Summer Enrolment <u>Balanced Term Enrolment</u>
Other Costs	17.0	Increase in Year Length	Summer Enrolment <u>Balanced Term Enrolment</u>

Note that the secondary variable introduces a scale effect on the incremental costs. Neglecting instruction costs, it would be relatively inexpensive to add a few students in the summer, but to add as many students as are enrolled in

the fall or spring terms would require large increases in these costs, at least to the full extent allowed by the primary variable.

The annual operating cost is calculated for the twenty years of operation considered in the model. To this cost is added that portion of the capital debt that falls due in a given year, to give a total annual cost. The total annual cost for each year over the 20 year horizon is discounted and added to give a net present value for each alternative.

The total cost, instruction cost, library cost, plant maintenance cost, administrative cost, capital cost and other cost by year as well as the present value of total costs are displayed in Table 3 of the computer output at Appendix C*. Table 3-4 gives these costs with no reduction in section sizes. Table 3-6 displays the same cost table with year round mean section sizes reduced to critical values. Table 3-10 repeats the same table with mean summer sections reduced to critical values.

7. Calculation of Section Size Reductions

A percentage increase or decrease in both year round average section sizes and summer average section sizes is calculated so that the present value of the alternative is made equal to the present value of the standard program.

*Under separate cover.

The starting values of average section sizes are shown in Table 3-3 of the computer output.*

The critical values of year round mean section sizes are shown in Table 3-5 and the corresponding percentage reduction is in Table 3-6. Similar values for summer section sizes only are shown in Table 3-8 and 3-9.*

B. Model Results

1. Conclusions

The following conclusions are based on the model results.

- a) Amortized capital costs make up a small portion of total annual costs in the university system as determined in the model. This is caused by a levelling off of student enrolments over the twenty years simulated and this factor has an important effect on the economics of year round operation.
- b) The model results indicate that there may be some economic advantage to be gained in switching to a trimester program. To achieve this, average section sizes must be kept at the same level as for the standard two term program. This may be difficult, if not impossible, to attain without a major alteration of course offerings.
- c) The quarter system with the same freshmen enrolment pattern as all other programs is economically

*Appendix C, under separate cover.

unattractive under all operating conditions that were examined in the model, and should be ruled out as a feasible alternative.

- d) There is a fair trade-off between savings in capital costs and increases in operating costs as the enrolment imbalance levels in the year round programs are varied. Consequently, the level of imbalance of term enrolments for the year round alternatives considered has little effect on the present value of total costs and critical section sizes.
- e) There appears to be less economic incentive, if any, to switch to year round operation with low values of the 1971 utilization factor.
- f) An increase in the ratio of instruction costs to amortized capital costs, with a reduction in average section sizes, indicates that there is less economic incentive to switch to year round operation. When the absolute values of the average section sizes for the programs considered were reduced, the present value of total costs rose, as did the average value of the critical section sizes.
- g) A reduction in student retention rates caused a slightly less than proportionate reduction in present value of total costs and had a negligible effect on the critical section size values.

- h) A reduction in projected student enrolments caused a proportionate reduction in the present value of total costs for all programs, and did not significantly affect the ranking of the alternatives by cost.
- i) A reduction in the net assignable square feet per student caused a much less than proportionate reduction in the present value of total costs and slightly reduced the economic incentive of year round operation.

2. Discussion of Results

Eight computer runs were made for different combinations of values for key input variables in order to determine the sensitivity of costs and critical section sizes to changes in these variables. The key variables and the eight sets of values are shown below:

Computer Run No.	Academic Level	Section Size	Retention Rates	Percent Utilization in 1971	Net Assignable Sq.Ft./ Student
1	1	33	1.00	90	130
	2	24	.89		
	3	21	.80		
	4	20	.36		
2	1	33	1.00	75	130
	2	24	.89		
	3	21	.80		
	4	20	.36		
3	1	33	1.00	60	130
	2	24	.89		
	3	21	.80		
	4	20	.36		

Cont'd

<u>Computer Run No.</u>	<u>Academic Level</u>	<u>Section Size</u>	<u>Retention Rates</u>	<u>Percent Utilization in 1971</u>	<u>Net Assignable Sq.Ft./ Student</u>
Cont'd					
4	1	28	1.00	90	130
	2	20	.89		
	3	18	.80		
	4	17	.36		
5	1	25	1.00	90	130
	2	20	.89		
	3	15	.80		
	4	8	.36		
6	1	33	1.00	90	130
	2	24	.74		
	3	21	.66		
	4	20	.30		
7	1	33	1.00	90	130
	2	24	.89		
	3	21	.80		
	4	20	.36		
Note: Freshman enrolments reduced 20% 1972-90.					
8	1	33	1.00	90	105
	2	24	.89		
	3	21	.80		
	4	20	.36		

Exhibit XIII shows the present value of total systems costs for the alternatives studied for different values of utilization, section sizes, retention rates, enrolment imbalance levels, freshman enrolment projections and net assignable square feet per student. Exhibit XIII is a summary of the percentage reduction in average section sizes which makes the discounted cost of the alternatives equal to that of the standard program for one set of parameter values, namely section sizes of 33, 24, 21, 20,

ALLOWABLE REDUCTION IN
SECTION SIZES IN ORDER TO EQUATE
THE PRESENT VALUE OF THE TOTAL COSTS OF
THE ALTERNATIVE PROGRAMS AND THE STANDARD PROGRAM

Parameter Set:		1	2	3	4												
Academic Level		33	24	21	20												
Section Sizes		1.0	.89	.801	.360												
Retention Rates																	
Utilization in 1971					.90												
		Term					Admissions				Enrollment				Mean Absolute		
							Imbalance Levels				Imbalance Levels				Deviation		
							1	2	3	4	1	2	3	4			
1. Standard 2 Term Program							.8	.1	.1		.46	.44	.10		15.7	.8	-
							.7	.2	.1		.41	.44	.15		12.3	1.1	7.0
							.6	.3	.1		.36	.45	.19		9.67	3.3	6.8
							.6	.2	.2		.41	.35	.20		9.0	3.5	-1.5
2. Trimester Program							.5	.4	.1		.31	.45	.24		7.67	-1.7	15.3
- 2 Terms on 1 Term off							.5	.3	.2		.36	.40	.30		6.33	3.0	-7.4
- 3 Student Streams							.4	.4	.2		.30	.40	.30		4.33	1.7	10.9
							.4	.3	.3		.35	.35	.30		2.33	5.6	5.3
							.34	.33	.33		.34	.33	.33		.33	6.1	16.5
																	16.4
3. Trimester Program							.9	.1			.46	.49	.05		19.0	-1.0	-28.4
- 2 Terms on 1 Term off							.8	.2			.41	.49	.10		15.7	-2.5	-34.2
- 2 Student Streams							.7	.3			.36	.49	.15		12.3	-4.0	-36.3
							.6	.4			.31	.50	.19		11.0	-5.6	-37.3
							.5	.5			.26	.50	.24		11.0	-7.2	-38.0
4. Trimester Program							.8	.1	.1		.36	.34	.30		2.30	.3	1.0
- 3 Terms on							.7	.2	.1		.35	.35	.30		2.30	1.0	3.1
- 3 Student Streams							.6	.3	.1		.34	.35	.31		1.67	1.2	3.7
							.6	.2	.2		.35	.34	.31		1.67	1.5	4.4
							.5	.4	.1		.33	.35	.32		1.00	1.1	3.3
							.5	.3	.2		.34	.34	.32		1.00	2.0	5.7
							.4	.4	.2		.33	.34	.33		.33	1.9	5.3
							.4	.3	.3		.34	.34	.32		1.00	2.6	7.3
							.34	.33	.33		.34	.33	.33		.33	2.8	7.9
5. Trimester Program							1.0				.37	.35	.28		3.67	-1.0	-3.1
- 3 Terms on																	
- 1 Student Stream																	
6. Quarter Program							.7	.1	.1	.1	.31	.30	.29	.10	7.5	-18.9	-
- 3 Terms on 1 Term off							.6	.2	.1	.1	.27	.30	.30	.13	6.0	-19.4	-
- 4 Student Streams							.5	.3	.1	.1	.24	.30	.30	.16	5.0	-21.0	-
							.5	.2	.2	.1	.27	.27	.30	.16	4.5	-19.8	-
							.4	.4	.1	.1	.20	.30	.30	.20	5.0	-22.6	-
							.4	.3	.2	.1	.24	.27	.30	.19	3.5	-21.3	-742.7
							.4	.2	.2	.2	.27	.27	.26	.20	2.5	-15.6	-202.2
							.3	.3	.3	.1	.23	.24	.30	.23	2.5	-22.5	-371.3
							.3	.3	.2	.2	.23	.27	.27	.23	2.0	-16.9	-159.9
							.25	.25	.25	.25	.25	.25	.25	.25	0	-14.4	-99.7

retention rates of 1.0, .89, .80, .36 and a 1971 utilization factor of 90%. The mean absolute deviation (MAD) of term enrolment levels is simply a convenient relative measure of the enrolment imbalance level. When term enrolments are in perfect balance, each term receives an equal proportion of the total enrolment for the year. In the case of the trimester system, the perfect balance proportion in each term would be 0.333. When term enrolments are not in perfect balance, deviations will occur from the perfect balance proportion in each term. The mean absolute deviation (MAD) is equal to the average magnitude of these deviations in each term. For example, if a trimester program had term enrolments in the following proportions .46, .44, .10, the MAD would be $(.13 + .11 + .23) \div 3 = .1567$. The higher the MAD value, the more imbalanced are the term enrolments.

Graphs VII-2 to VII-9 are plots of total annual costs versus time for the standard semester system, the trimester system and the quarter system for the indicated changes in parameter values.

Graphs VII-10 to VII-16 are plots of percent reduction in section sizes versus the enrolment imbalance levels for changes in utilization rates, section sizes, retention rates, freshman enrolment projections, and net assignable square feet per student.

a) Capital Costs Versus Total Costs

Graph VII-1 in this chapter shows capital cost and total cost plotted against years for the standard two term program for a 1971 utilization factor of 90%. Also plotted on this graph are annual capital costs and maximum term enrolments. As explained in the previous section of this chapter, capital costs are a function of the 1971 utilization factor and the maximum term enrolments and for this case account for approximately 12% of the total annual costs of the system at their highest level. As the 1971 utilization rate is reduced, it is reasonable to expect that capital costs are reduced and therefore 12% is the maximum percentage of total costs that is reached.

Since the economic advantage in switching to year round operation is based on some saving in capital costs over an increase in operating costs, the absolute value of capital costs is an important factor. With the projected stabilization in university enrolments, capital expansion is no longer required after a certain time (approximately 1981 in the model) and therefore the economic advantage of year round operation would be decreased.

b) Critical Values of Average Section Sizes

The highest value of reduction in average year round section sizes to the critical values was approximately 6% as shown, Exhibit XIII. This occurs for the trimester program with three starting freshmen classes, a student attendance pattern of two terms on, one term off, and balanced term enrolments.

The low value of percent reduction in section sizes indicates that a university could not economically switch to trimester operation with a high proportion of non-sectioned courses if it attempted to maintain its same course offerings. This is because it would probably incur a reduction of average section sizes that would be greater than 6%.

c) The Quarter System as a Year Round Alternative

Exhibit XII shows that the present value of total costs for the quarter system is higher for all parameter sets and for all levels of term enrolment imbalance levels. Graphs VII-2 to VII-9 show that the total annual cost profile is also considerably higher. On this basis, the Quarter system should be ruled out as a feasible alternative.

d) Costs and Critical Section Size Versus Enrolment Imbalance Levels

Results on Exhibit XIII show that there exists only a slight variation in the present value of total

costs as the term enrolment imbalance goes from a high degree of imbalance to a perfectly balanced condition. Graph VII-10 and Graph VII-11 show that both year round and summer critical section sizes are a flat function of MAD or term enrolment level of imbalance. This points to the fact that as the term enrolments approach the balanced condition, the increased saving in capital costs in changing to a year round program is offset by a corresponding increase in operating costs.

e) Costs and Critical Section Sizes
Versus 1971 Utilization Rates

Exhibit XII shows the present values for three sets of 1971 plant utilization rates. The present value of total costs reduces as the plant utilization rate goes from 90% to 60%. The difference expressed as the present value of total costs for the alternative minus that for the standard program becomes smaller and in fact becomes negative as the utilization rate drops from 90% to 60%. This is caused by fewer amounts of capital outlay as the utilization rate decreases. In other words, with a 1971 utilization rate of 60%, the increases in students enrolments through 1990 are serviced by smaller capital expansion costs than for a starting utilization rate of 90%, which reaches its plant capacity at an

earlier date. With reduced plant expansion required at the lower utilization values, the reduced savings in capital costs are offset to a larger extent by the same increase in operating costs of the year round system. Hence the allowable reductions in critical section size values are less for each imbalance level. This effect is shown in Graph VII-12.

f) Costs and Critical Section Sizes Versus
the Absolute Value of Average Section Sizes

When the absolute value of the average section sizes was reduced by approximately 15%, there was a corresponding increase in the present value of total costs. Comparison of Graphs VII-2, VII-3 and Graphs VII-6 and VII-7 shows that this holds for all year round plans considered. Graph VII-13 shows a plot of percent reduction in section sizes versus level of imbalance for three absolute values of average section sizes. The percent allowable reduction in section sizes falls as the absolute values of section size decline.

This occurs because as the absolute value of section sizes decreases, instruction costs and therefore operating costs increase. Capital costs remain constant and are a smaller portion of total costs.

The savings in capital cost in going to year round operation remain the same when the absolute value of section sizes is reduced. The difference in operating costs is increased because of the lower section sizes and now offsets the capital cost saving, making year round operation uneconomical.

g) Costs and Critical Section Sizes Versus Retention Rates

The retention rates were reduced by approximately 17% and another computer run was made to observe the effect on output variables. While the present value of total costs was reduced by approximately 12%, there appeared to be no change in the values of section size reductions. This effect is shown in Graph VII-14.

h) Costs and Critical Section Sizes Versus Projected Freshman Enrolments

The projected freshman enrolments in years 1972 through 1990 were reduced by 20% to see what the effect would be on the output variables. The enrolment in 1971 was left the same so that comparisons might be made with the present values of total costs derived from the previous runs. The present value of total costs was reduced by approximately 20% for each of the programs and the reduction was slightly lower for the year round operation alternatives than for the

standard semester system. This made year round operation slightly less attractive economically than it had appeared with the higher enrolment projections. The smaller reductions in the present value of total costs for the year round alternatives caused the allowable reductions in critical section size values to be less for each imbalance level. This effect is shown in graph VII-15.

i) Costs and Critical Section Sizes Versus
Net Assignable Square Feet Per Student

When the value of net assignable square feet per student was reduced from 130 to 105 (19%), there was a slight reduction in the present value of total costs for all alternatives (1%-2%). The reduction was slightly less for the year round operation alternatives than for the standard semester system because the savings in capital expenditures achieved by year round operation were reduced while the increase in operating expenses remained the same. The effect was to reduce allowable reductions in critical section size values for each imbalance level. This effect is shown in Graph VII-16.

3. Future Applications of the Computer Model

The computer model developed in this analysis could be used to forecast the economics of year round operation for specific universities and colleges in the

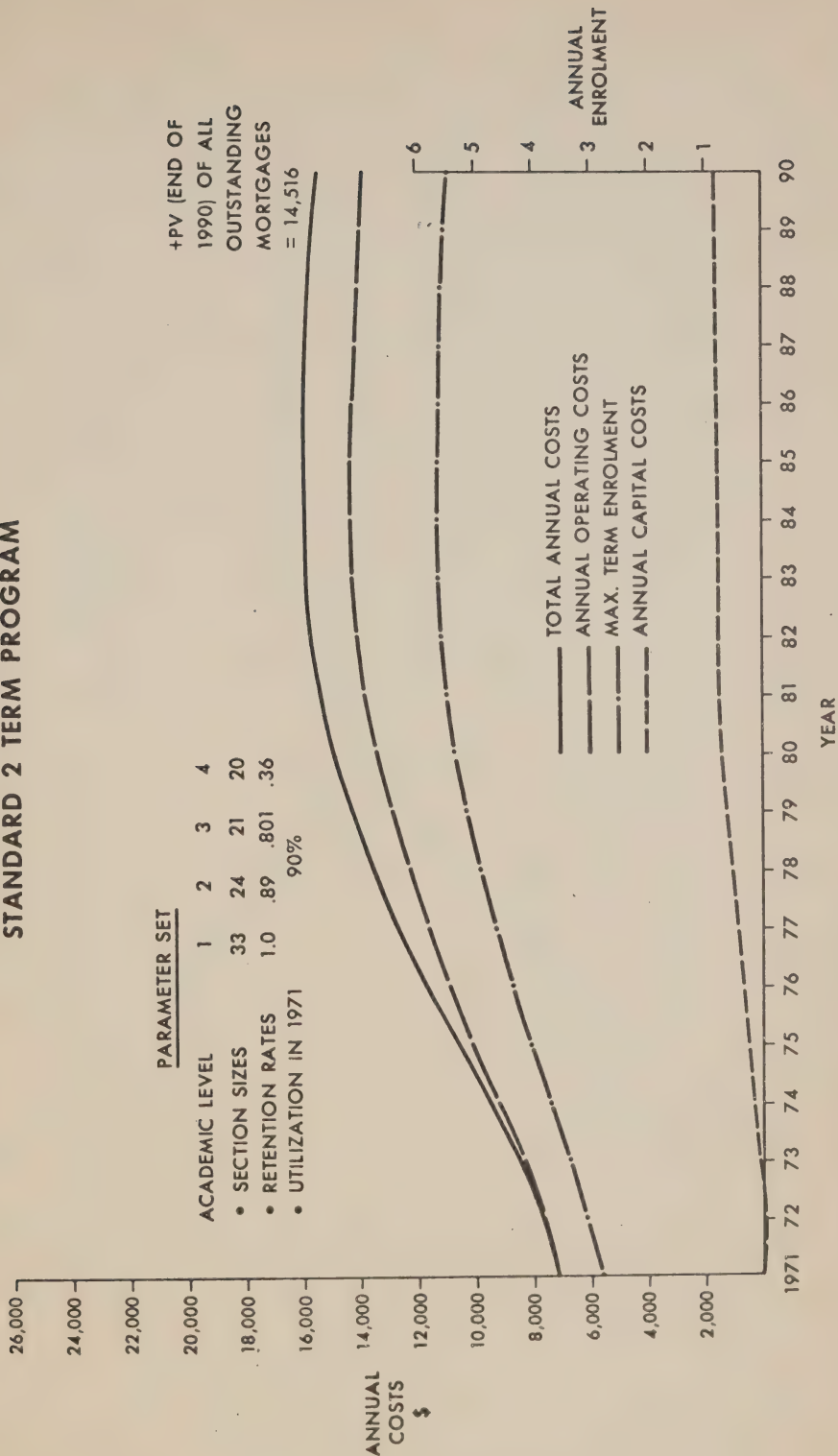
Ontario system. To do this, a detailed cost analysis for the institution under consideration would have to be made. This would include breaking down costs into defined categories as used in the model, or other categories particular to that institution. The time involved for this aspect of the study would depend on the availability and form of the cost data. Enrolment forecasts would have to be made if none existed, and the effect on these forecasts predicted should the school under study switch to year round operation. Retention rates would have to be determined, not only across academic levels but across departments, to determine if there would be significant changes by department. The model developed for this study used average retention rates for the province which differed only by academic level. Some measure of instructional space utilization would have to be made for the institution under consideration and this could involve a study of classroom use if data were not available. Finally, an analysis would have to be made of course offerings and section sizes. The total number of courses offered as well as the number of multiple sections for each course would have to be determined. Average section sizes by academic level would have to be determined for each department within the school.

Generally speaking, to fix some of the parameters that were considered variables in this study would require detailed preparation and analysis of the data for a specific institution.

ANNUAL COSTS * vs.

YEARS

STANDARD 2 TERM PROGRAM

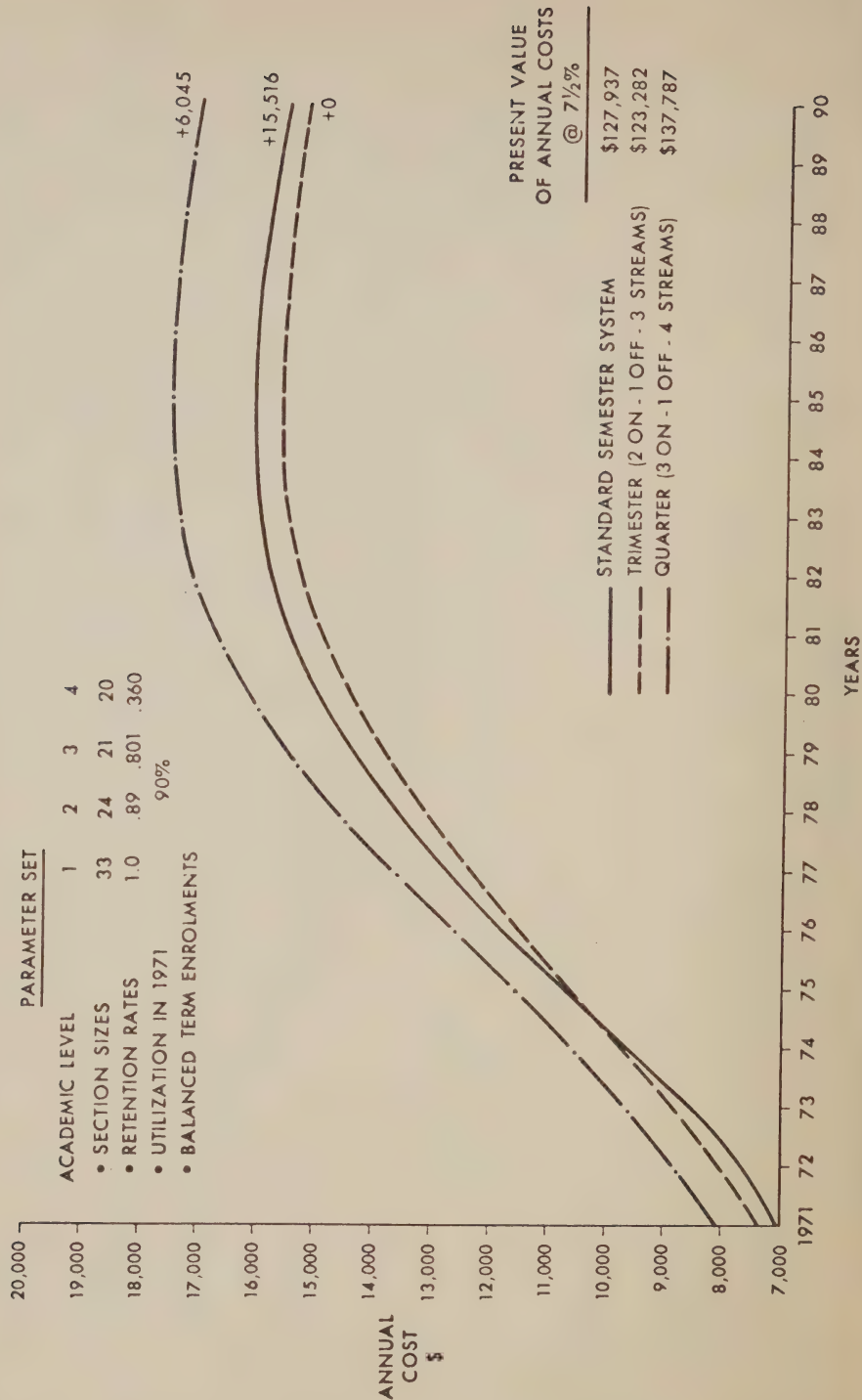


* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST*

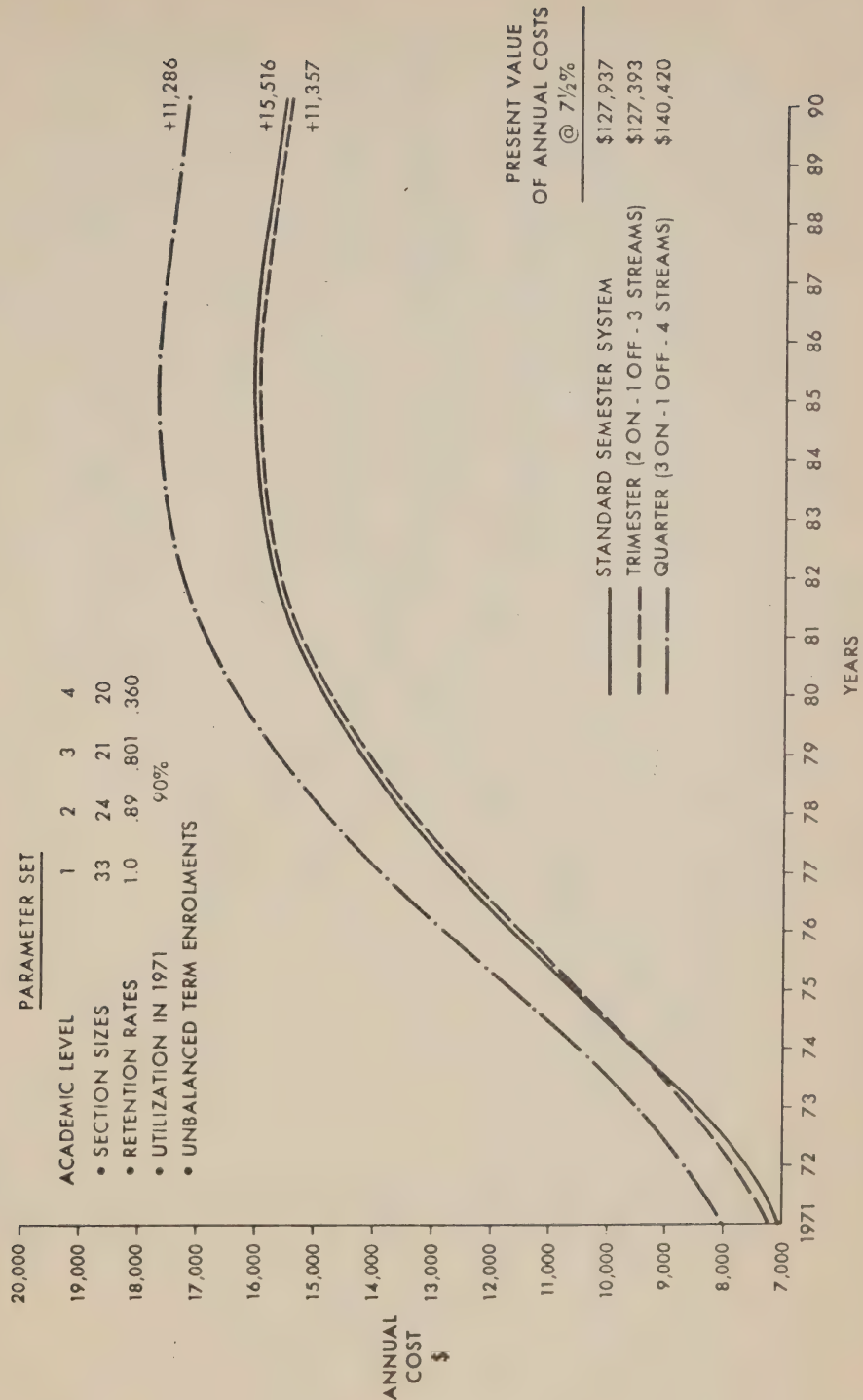
vs.

YEARS



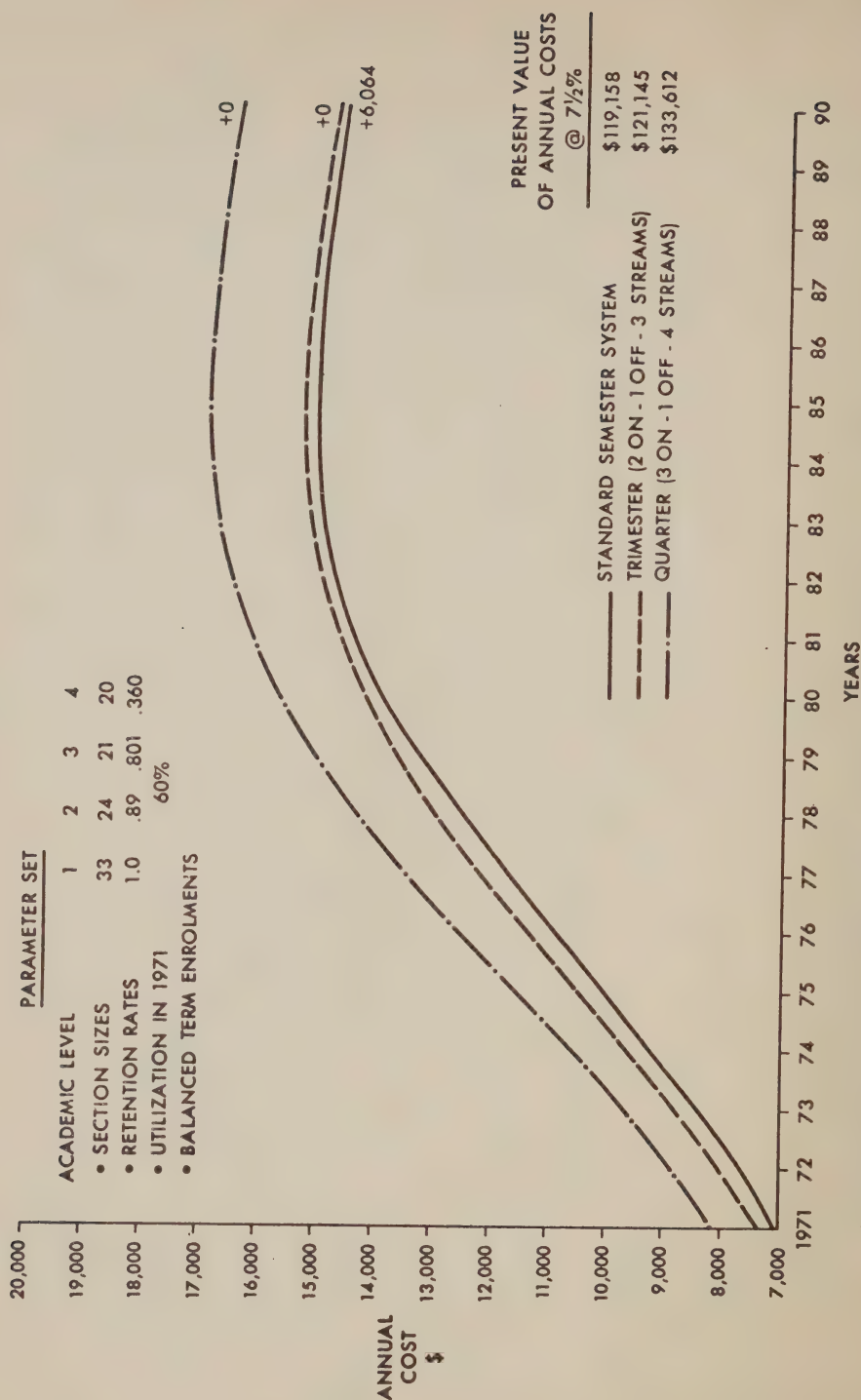
* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST *
vs.
YEARS



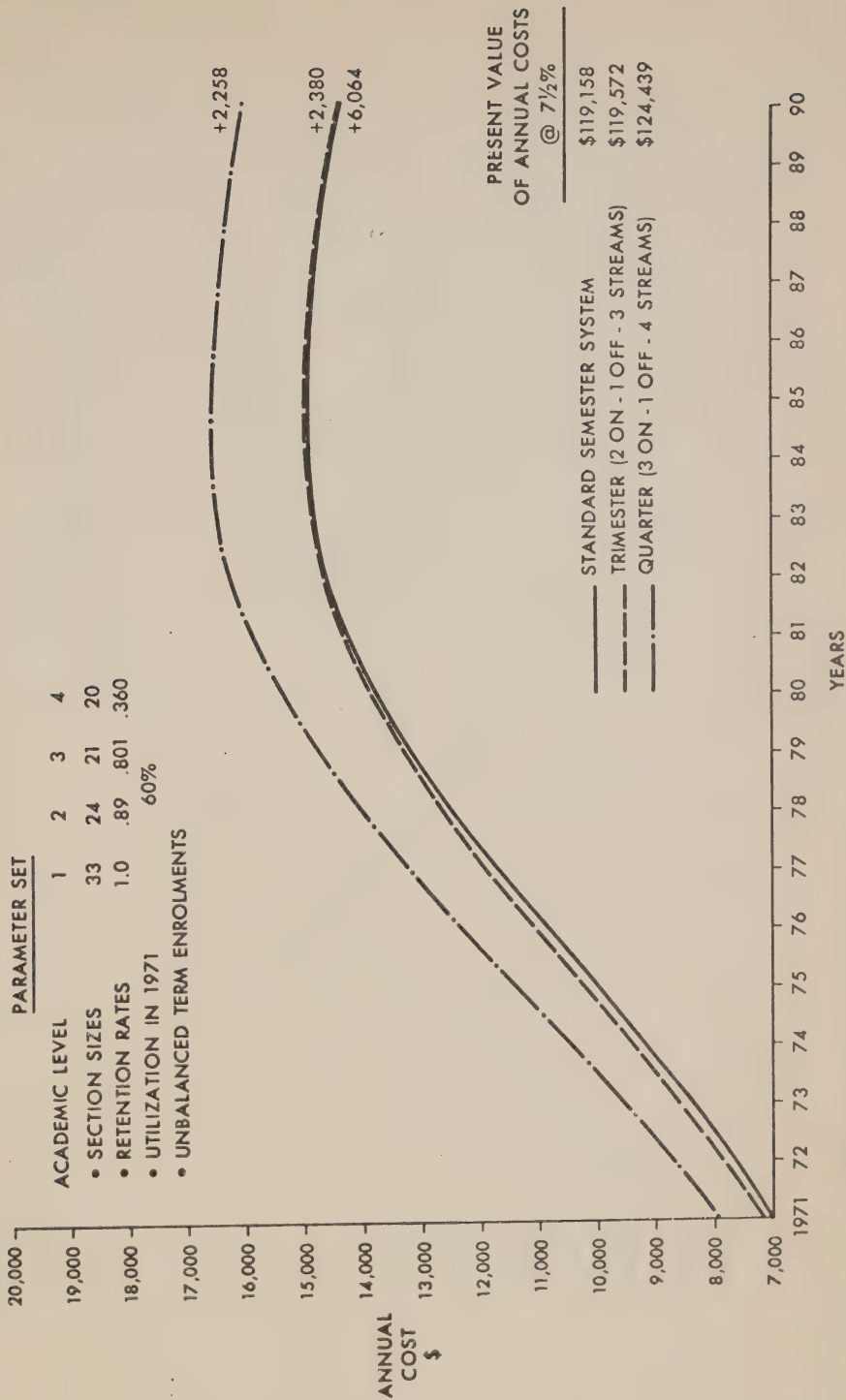
* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST* vs. YEARS



* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

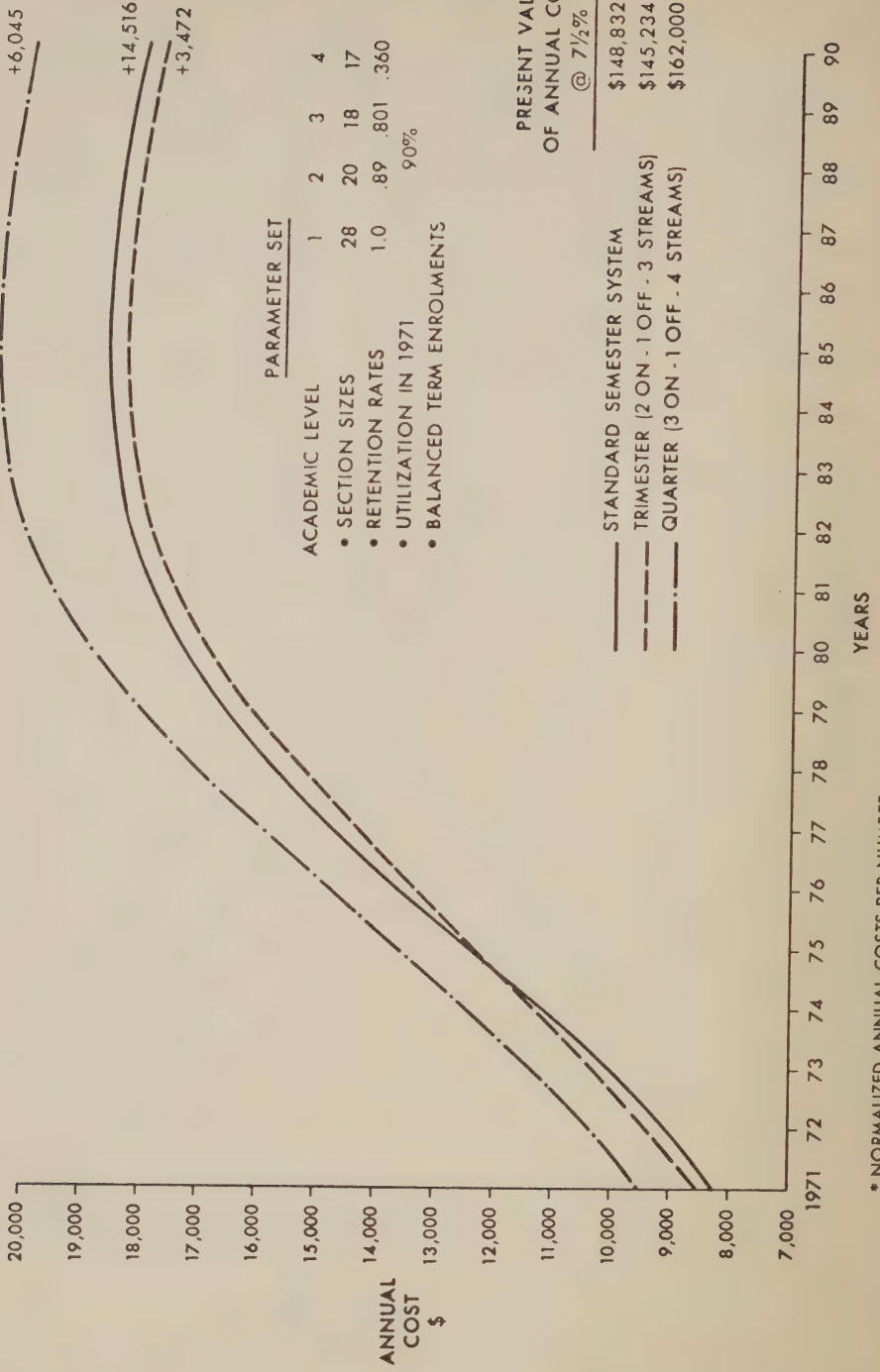
TOTAL ANNUAL COST * vs. YEARS



TOTAL ANNUAL COST *

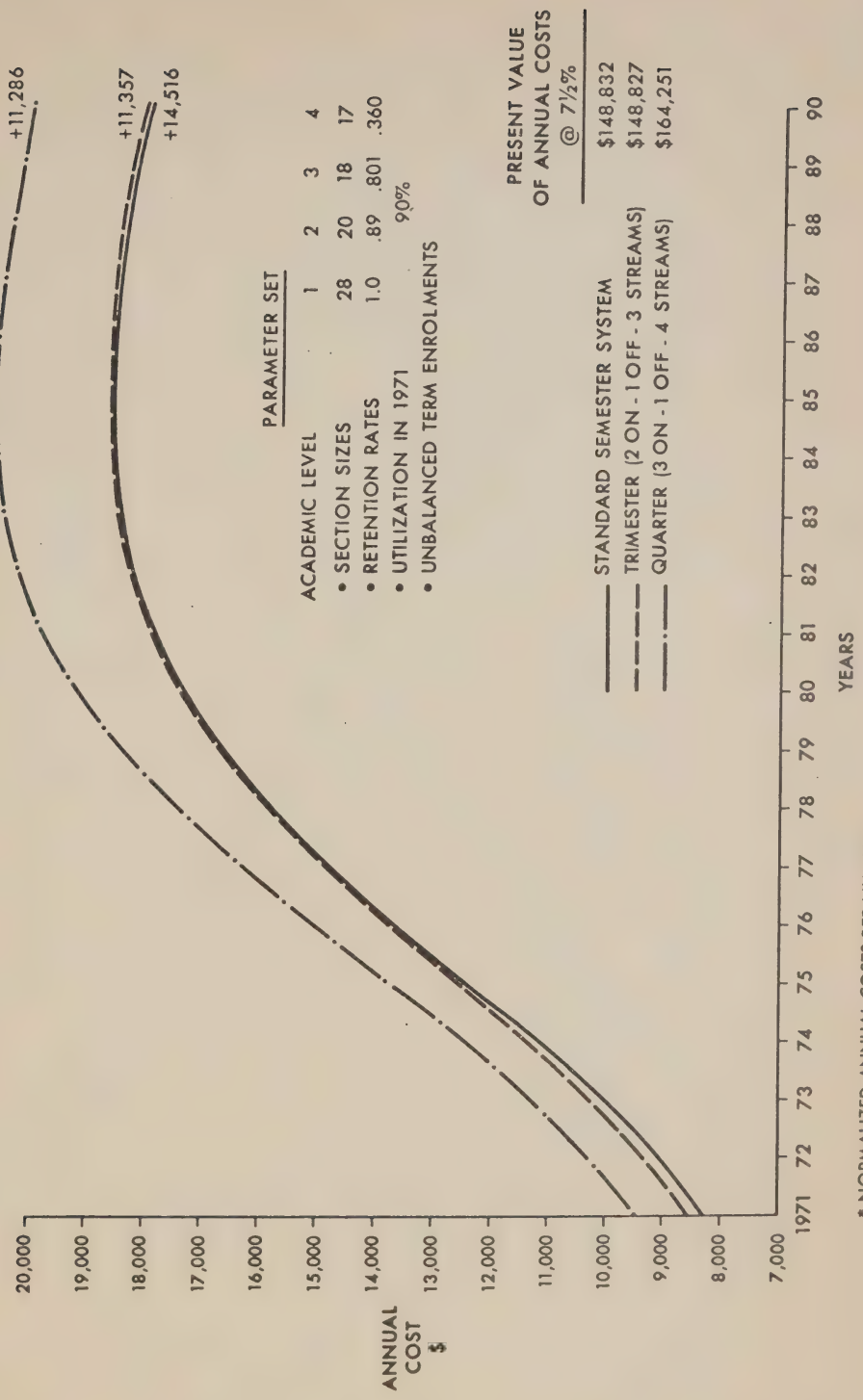
VS.

YEARS



* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST *
VS.
YEARS

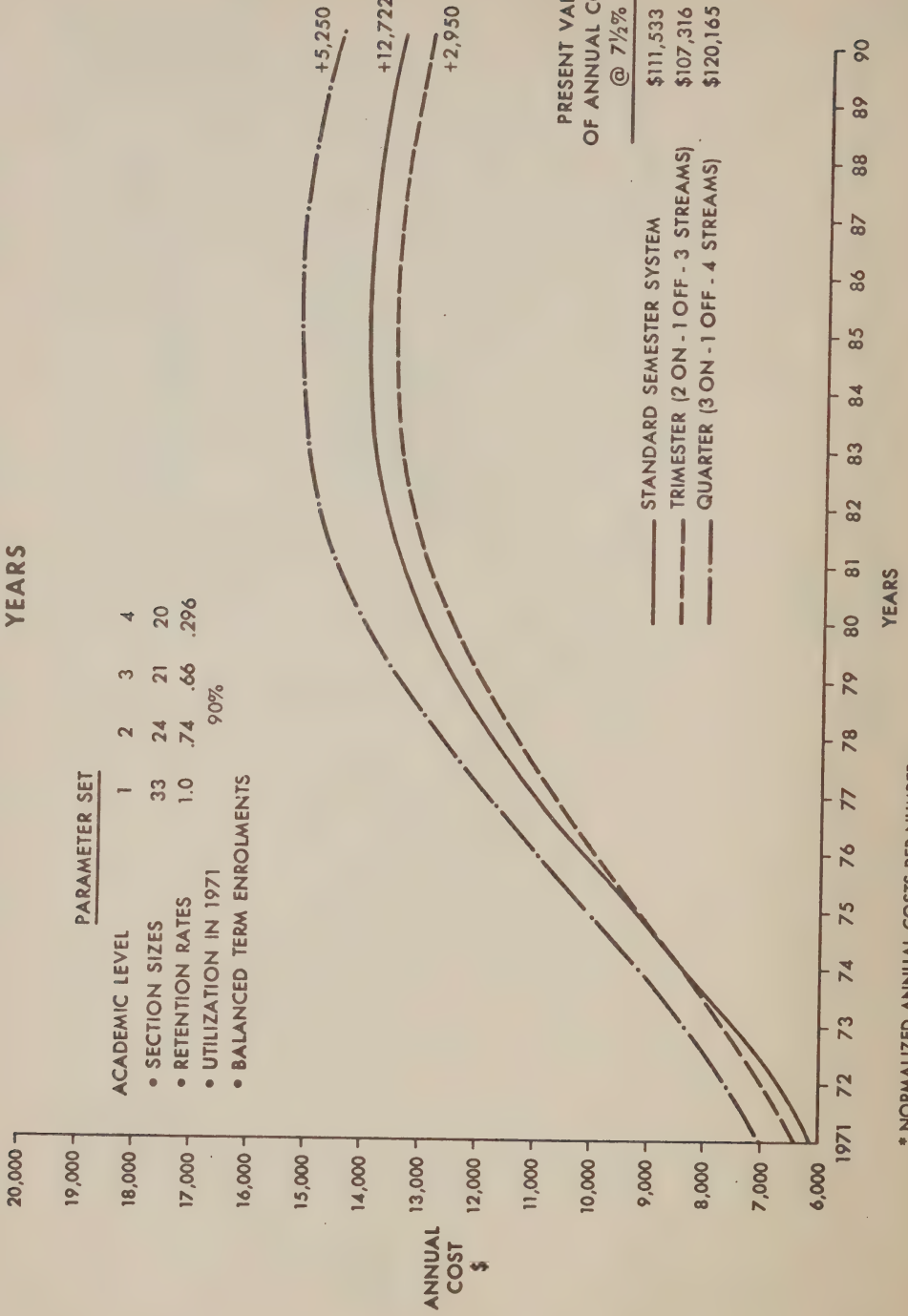


* NORMALIZED ANNUAL COSTS PER NUMBER
OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST*

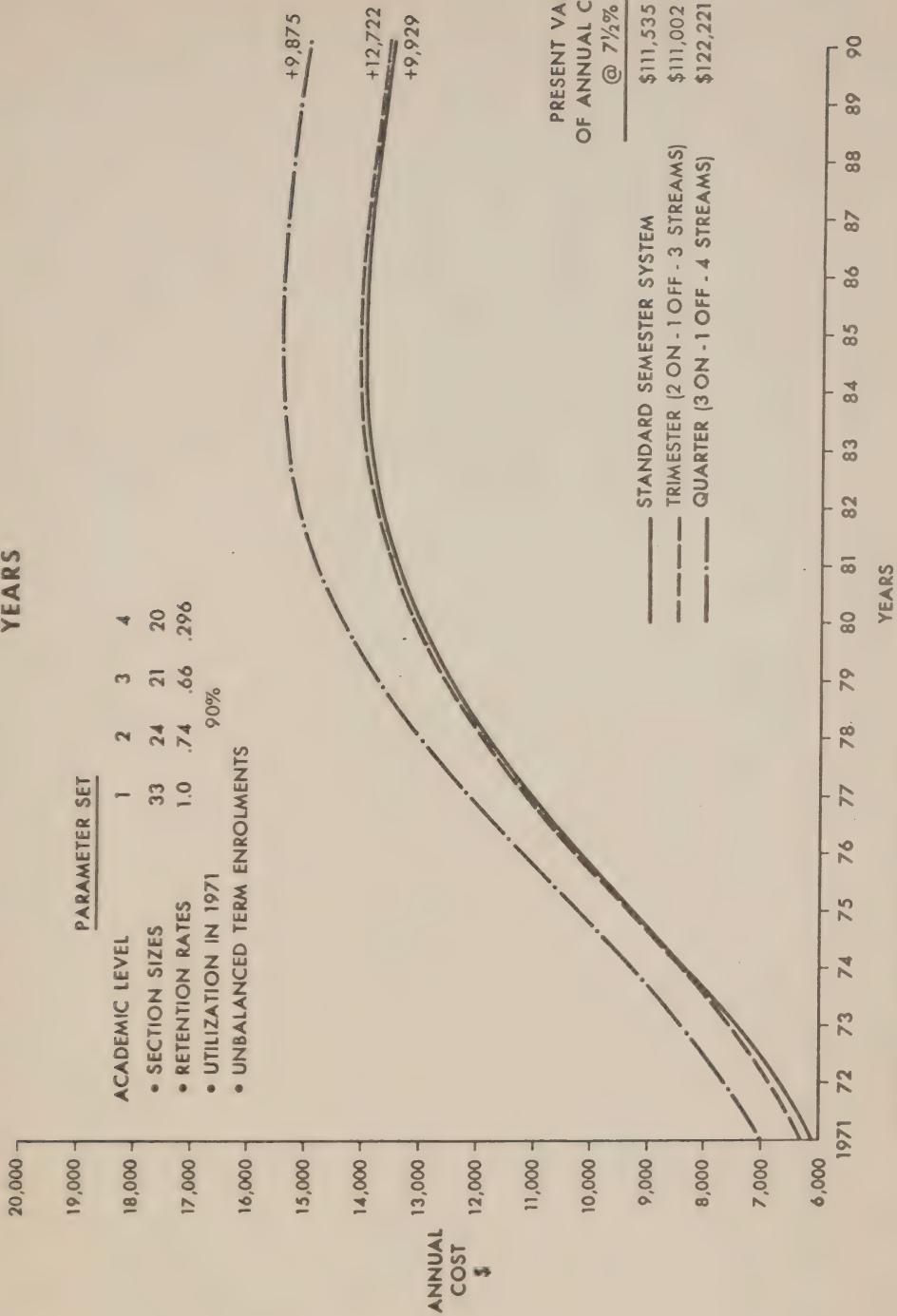
vs.

YEARS



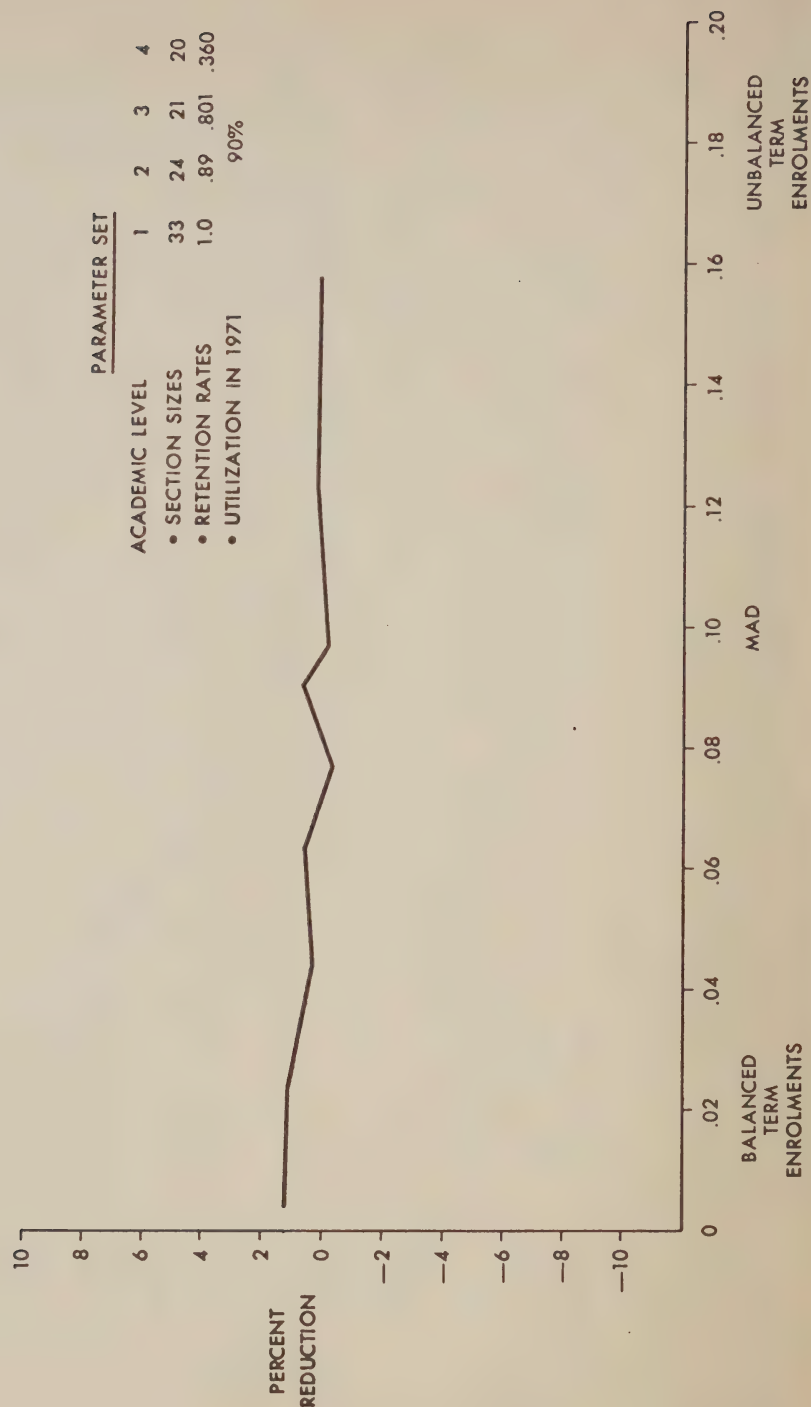
* NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

TOTAL ANNUAL COST*
VS.
YEARS

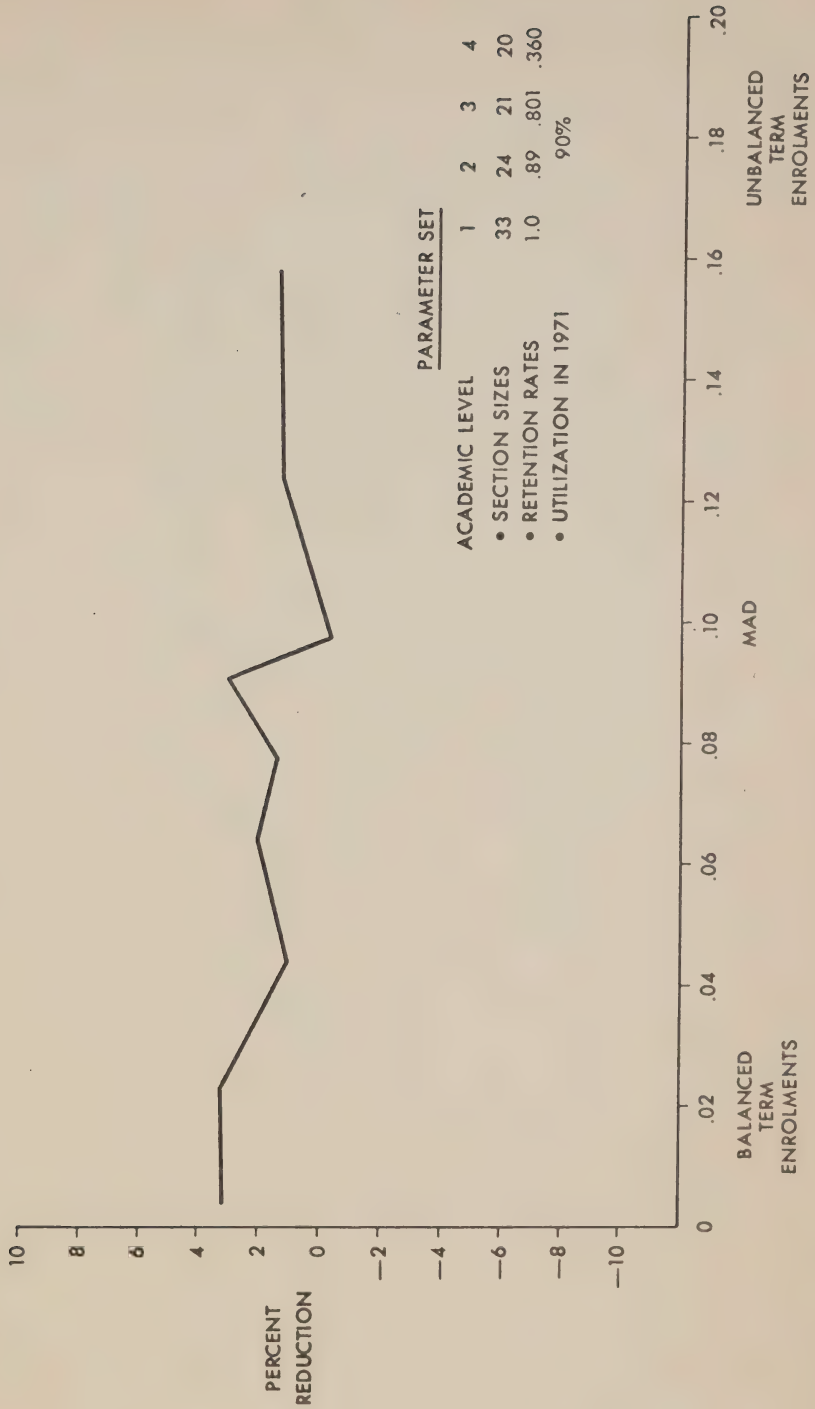


* NORMALIZED ANNUAL COSTS PER NUMBER
OF FRESHMEN STARTING IN 1971

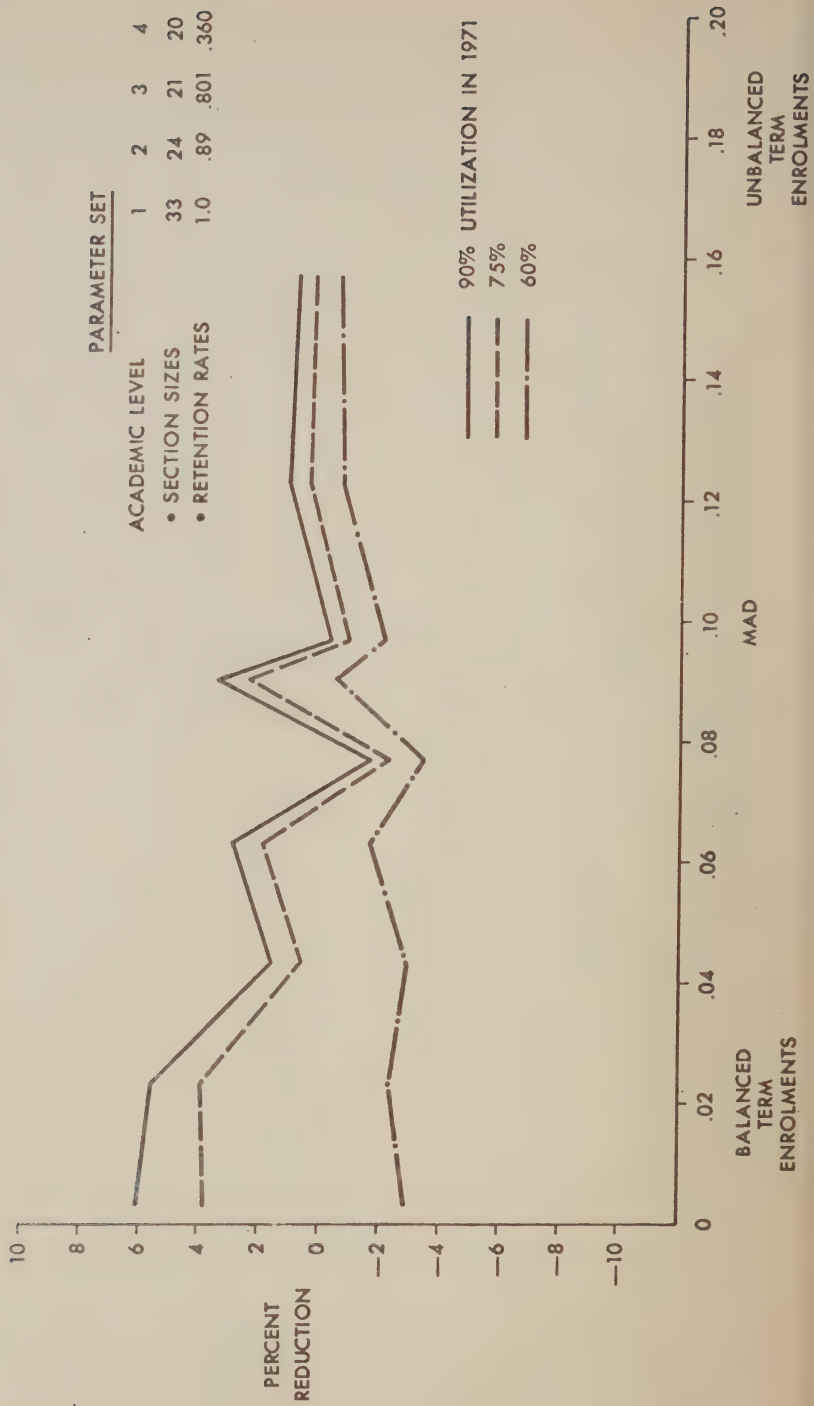
YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
TRIMESTER PROGRAM 2 ON -1 OFF - 3 STREAMS



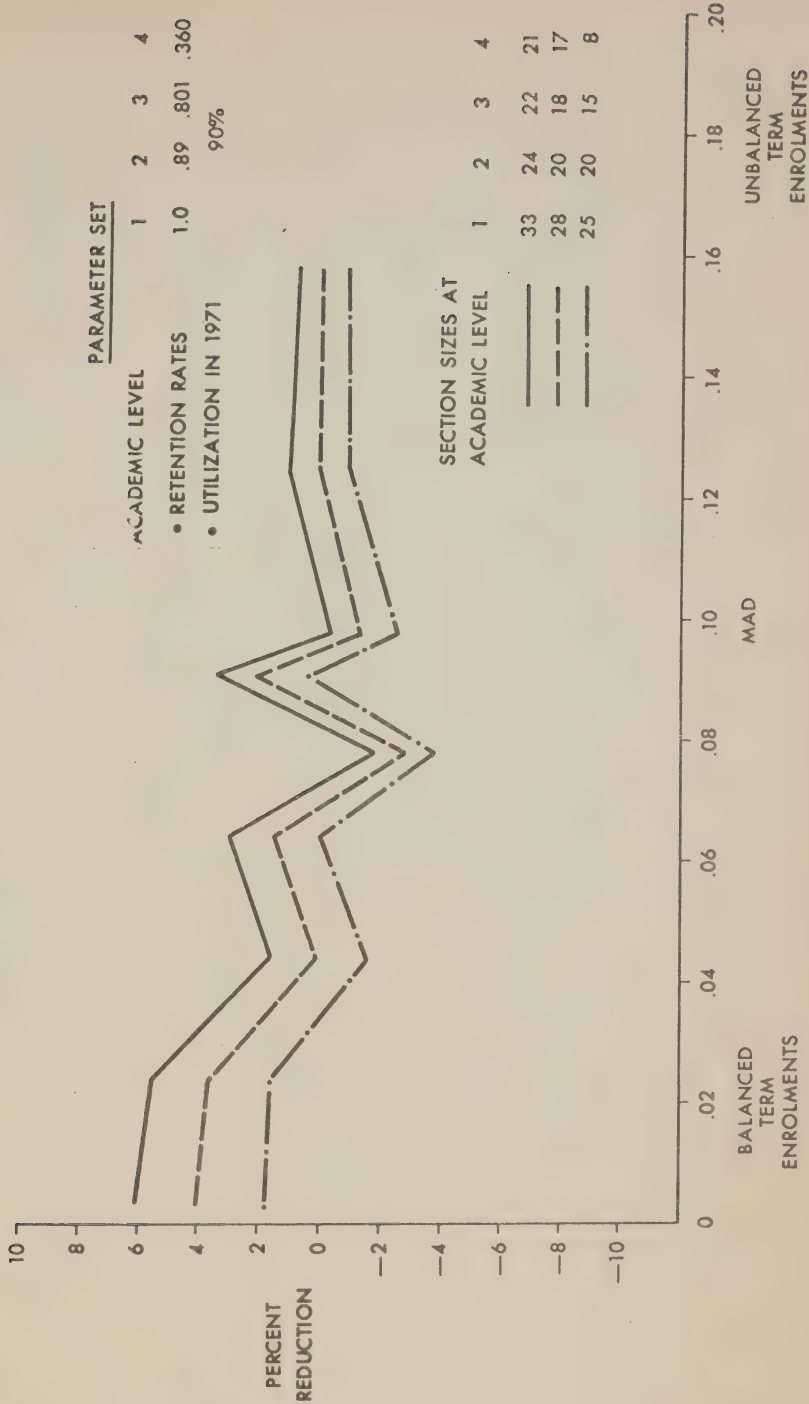
SUMMER SECTION SIZE REDUCTION
vs.
LEVEL OF IMBALANCE (MAD)
TRIMESTER PROGRAM 2 ON -1 OFF - 3 STREAMS



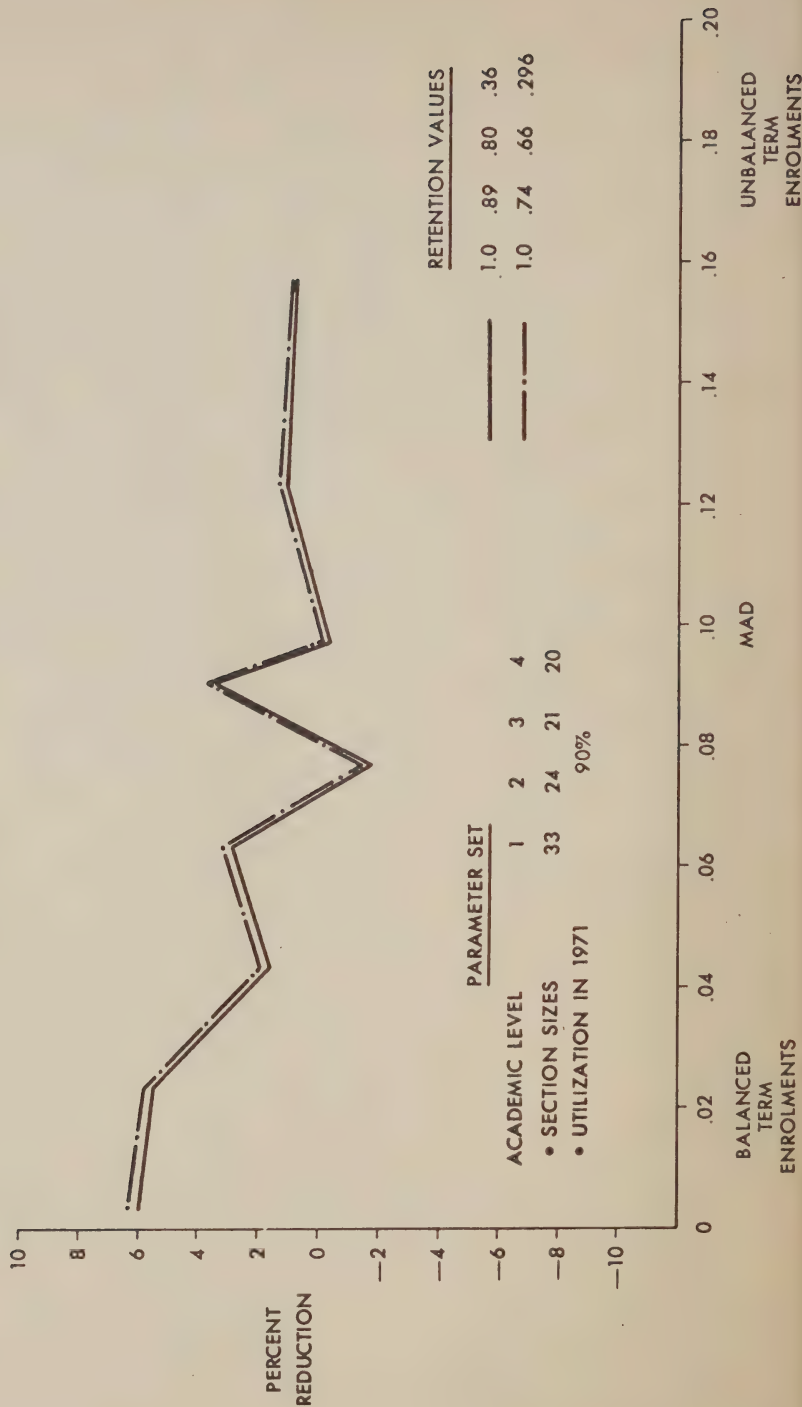
YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR THREE LEVELS OF UTILIZATION
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



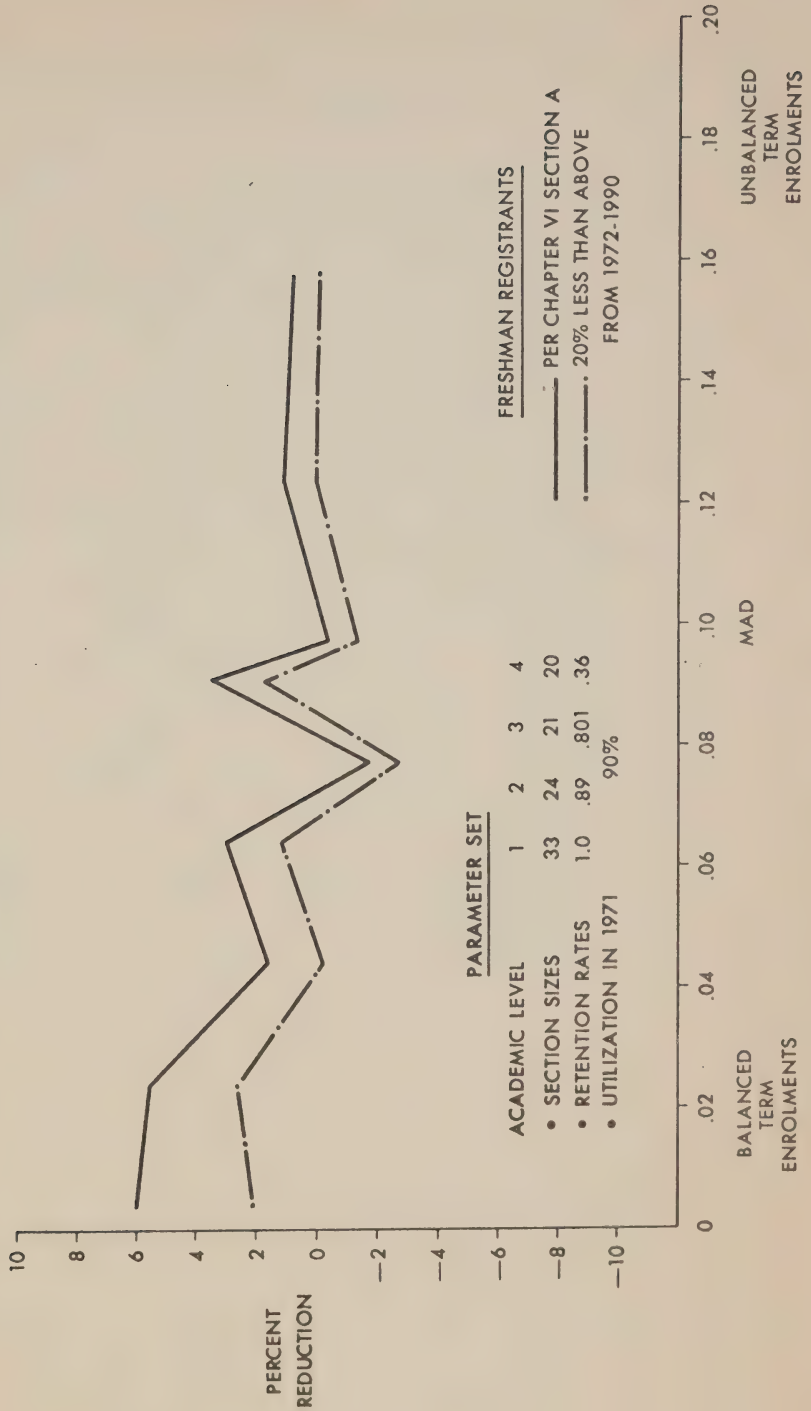
YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR THREE LEVELS OF SECTION SIZE VALUES
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



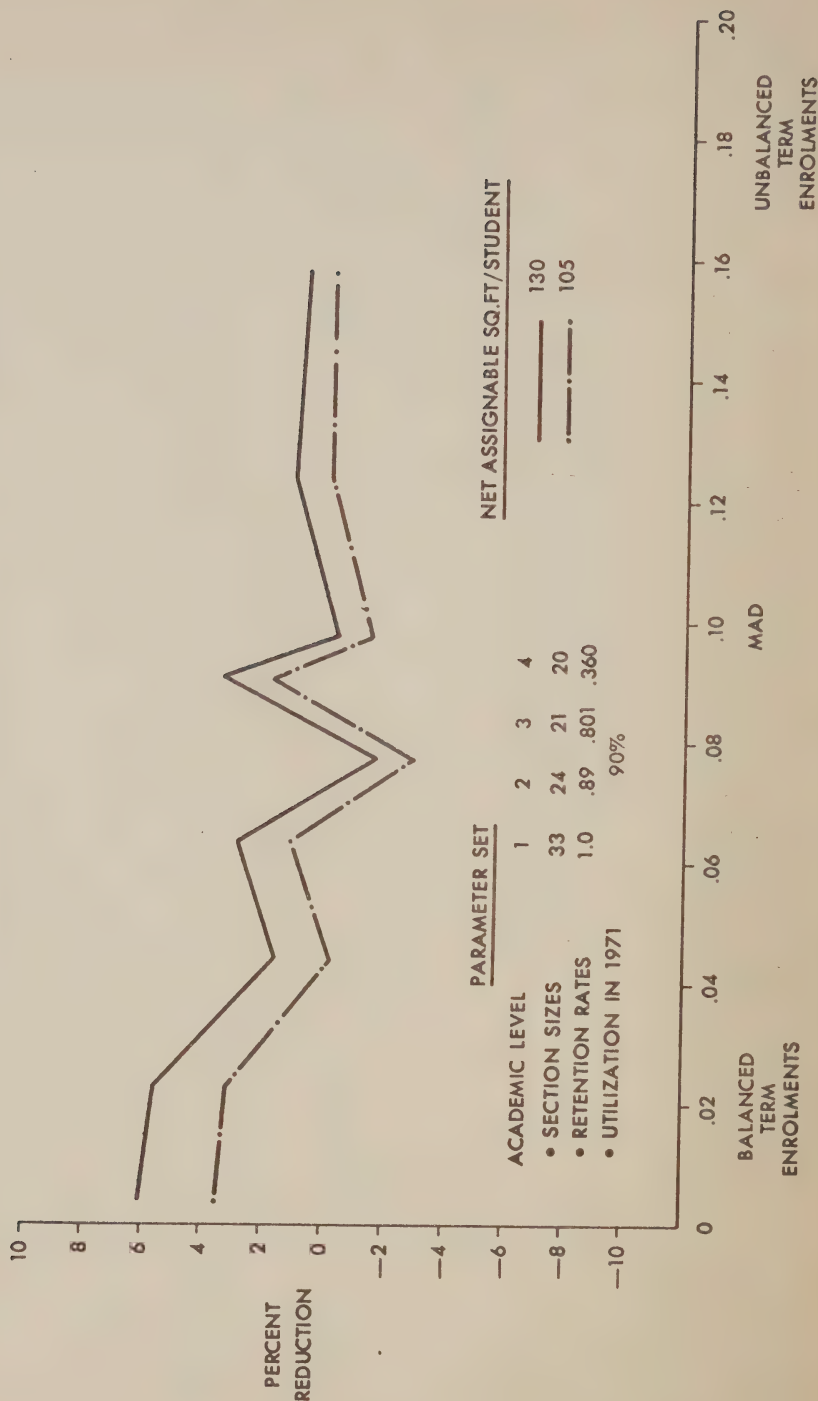
YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR TWO SETS OF RETENTION RATES
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR 2 SETS OF FRESHMAN ENROLMENT PROJECTIONS
TRIMESTER PROGRAM 2 ON -1 OFF - 3 STREAMS



YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR 2 VALUES OF NET ASSIGNABLE SQ.FT PER STUDENT
TRIMESTER PROGRAM 2 ON -1 OFF - 3 STREAMS



CHAPTER VIII - CO-OPERATIVE EDUCATION AND WORK-STUDY PROGRAMS

In Chapter III, which describes alternate calendar systems, we have described briefly the operation of co-operative and work-study programs. In this chapter, we describe this method of post-secondary education in detail, specific programs at certain Canadian and American universities and colleges, the extent of their success and some of the problems encountered. Also, we discuss the advantages and disadvantages of these work-study systems and comment upon extending the role of this educative method in the province of Ontario.

We have devoted an extensive part of this study to co-operative programs because a university or college adopting the work-study method is generally forced to a year round operation. With relatively high enrolment, a work-study system could increase fairly significantly the utilization of the university's or college's plant facilities devoted to instructional purposes.

A. Common Systems - Canada

The co-operative systems best known in Canada are the programs offered currently at the Universities of Waterloo and Sherbrooke. At these two institutions, freshmen students enrol in the fall term and the classes are then

divided at Christmas, with half staying for another semester on campus and half going to employers for their first work term. Each group of students (stream) subsequently alternates between campus and industry every four months until six work terms have been completed, when both groups come together for the final undergraduate semester. With the addition of the six work terms, an honours degree is obtained after five years rather than the normal four years.

Other Canadian institutions known to have co-operative education programs are:

Memorial University, Newfoundland - Engineering

University of Saskatchewan, Saskatchewan - Engineering

Nova Scotia Technical College, Nova Scotia - Engineering and Architecture

1. University of Waterloo

The University of Waterloo is heavily committed to co-operative education. Between 4,500 and 4,800 students are enrolled in the co-operative programs which include the following disciplines:

- Faculty of Engineering
- Applied Physics and Applied Chemistry in the Faculty of Science
- Faculty of Mathematics
- Division of Environmental Studies (Architecture)
- Kinesiology and Recreation

The Faculties of Science and Mathematics operate conventional academic programs in addition to the co-operative programs. However, co-operative education is compulsory for those students registered in Engineering and Architecture.

Approximately 2,500 students are enrolled in Engineering (undergraduate) and the University produces between 35% to 40% of all Engineering students in Ontario. The members of the University Administration feel that the general levels of undergraduate enrolment are consistent with the offerings of a successful teaching program of appropriate variety and with present employment opportunities for relevant co-operative work experience.

Some of the more pertinent aspects of the Waterloo program are summarized below:

- a) When the co-operative program was initiated at the University of Waterloo in 1957, the calendar year was divided into four terms, each of three months duration, with the students spending alternate terms on campus and in industry, and with total numbers on campus and in industry at any given time intended to be approximately equal. In the fall of 1962, the University moved to the trimester system to reduce the number of repeat courses, create more even enrolments by semester, give students an opportunity for work sessions in different seasons

of the year, and eliminate the possibility of a student going to school for four successive summers.

- b) The trimester system provides for a more effective utilization of classroom and laboratory space. It is seen that a larger number of students can be accommodated in the same physical facilities when compared to the traditional year calendar followed by the majority of Canadian Universities.

This improved utilization is particularly important because of the high cost of laboratory facilities.

- c) The student staff ratio compares favourably to that experienced in a traditional year calendar system.
- d) Members of faculty and administration noted that students returning to campus from the work term have a mature and highly motivated attitude towards their academic studies. There are few complaints from students who attend the summer semesters. Those students involved in inter-collegiate sport are, if possible, placed in local job situations so that they may continue to participate. In general, the trimester system has little effect on other University activities for the student.
- e) Of those students entering employment immediately upon graduating with a Bachelor Degree in Engineering, about 99% accept full-time employment in Canada.

- f) There is a favourable reaction from faculty once they become involved in the co-operative program. Normally, faculty will teach two out of three semesters, but they can teach four continuous semesters and then have an eight month period of research, consulting, travel, etc. As a result, faculty can take the opportunity to involve themselves with industry or government for an extended period of time, giving them the opportunity to develop more relevant and up-to-date course material.
- g) The placing of students in relevant work positions in industry and government, or the function of "co-ordination", is considered to be an essential of the co-operative program at Waterloo. Each Co-ordinator on the University's staff is expected to look after about 150 students. The Co-ordinators are graduates and members of their relevant profession themselves. They are "field based" and are expected to spend about two-thirds of their time visiting students and employers. Many employers are involved, with Waterloo averaging two students per employer in order to minimize the effects of economic recession. Students are frequently placed with smaller firms. As a result, these firms see the

advantages of hiring a graduate engineer, and there are several instances where firms have started with a co-operative engineering student and subsequently hired one or more graduate engineers.

- h) The efforts required to run a successful co-ordination program are quite significant in terms of ensuring effective use of co-operative students and the finding of new employers.
- i) It is estimated that the extra costs of co-ordination, three registrations and year round teaching for each student, is in the range of \$300 to \$400 each year. Students pay an additional fee of \$60 each academic term towards these extra costs. The University provides these co-ordination services and operates a year round academic program for co-operative education within the formula grant financial assistance provided by the Province of Ontario. Waterloo has been able to achieve certain efficiencies by way of relatively large enrolments and the control of class or section sizes through each of the five years of the undergraduate programs. The latter feature, the ability to control enrolment in each semester, makes the co-operative system significantly different from normal free choice trimester systems and therefore more efficient.

2. University of Sherbrooke, Province of Quebec

The University of Sherbrooke uses the co-operative education method for the following programs:

- a) Faculty of Engineering (civil, electrical, mechanical and chemical);
- b) Faculty of Administration - Master's degree;
- c) Faculty of Social Work.

In addition, the University plans to adopt co-operative education for its mathematics program in the near future.

Co-operative education programs are relatively new at the University, commencing with Engineering in the 1965/66 academic year. The University produced its first graduating class from the co-operative program in 1971.

The University of Sherbrooke's co-operative programs are similar in format to those of the University of Waterloo, in that both use a trimester calendar.

The University of Sherbrooke is of particular interest since it is encountering certain problems in developing its co-operative programs. Some of the major problems are described below.

- a) The annual freshmen intake at Sherbrooke has been 150 students over the past two years. This produces a total undergraduate enrolment of about 650 students over the five year engineering program. Because of

the 'streaming' of students and the requirement to repeat courses in each year, certain members of the faculty commented that this is only one-half of the total enrolment necessary to sustain optimal class sizes in the final years of specialization and to achieve a viable student/staff ratio. In their opinion, total undergraduate enrolment should be at least 1,000 at any given time with freshmen registrations being in the area of 300 students.

- b) Further control over the student/staff ratio in engineering is exercised by limiting the number of optional courses made available to undergraduates.
- c) The University considers the work experience to be a very important element in co-operative education. Consequently, considerable resources in terms of people and dollars are devoted to finding job situations which will relate closely to the educational programs. The University is very selective in choosing employers who are prepared to provide meaningful work to students - work that is properly staged with respect to course level and with extensive supervision. Several years are required to find a large number of employers within the private and governmental sectors who are prepared to receive a continuing flow of co-operative students. The schedule below compares

student enrolments with the number of Co-ordinators employed by Sherbrooke.

ESTIMATED NUMBER OF STUDENTS

	<u>Enrolment</u>	<u>In Work Term</u>	<u>Co-ordinating Staff</u>
Engineering	650	300	6
M.B.A. Program	135	65	1
Social Work	210	105	2
Applied Mathematics (Commencing September, 1971)	<u>50</u>	<u>50</u>	<u>1</u>
Total	<u>1,045</u>	<u>520</u>	<u>10</u>

The above schedule indicates that, on average, each Co-ordinator is responsible for about 100 students. The annual cost of co-ordination exceeds \$250 per student, which is covered in part by an additional fee for students enrolled in co-operative programs.

3. Colleges of Applied Arts and Technology
in Ontario

A few Colleges in Ontario either have started, or are contemplating, co-operative education for certain of their faculties.

Mohawk College of Applied Arts and Technology, Hamilton, follows the University of Waterloo calendar format for the following disciplines: Industrial Management, Communication Arts, Computer Systems, and Electronics and Control Systems.

It is estimated that total enrolment in these programs in 1971-72 will be approximately 300 students. Only moderate growth in co-operative programs is planned at Mohawk College within the immediate future. There are two constraints: first, the additional costs of co-operative programs which must be covered by the normal formula grants to Ontario colleges, and second, the problems of finding employers to give students properly supervised and relevant work experience.

Fanshawe College of Applied Arts and Technology has co-operative programs for Child Care and Social Service Work, and is introducing a program in Civil Technology.

We have not had an opportunity to survey all twenty Colleges to determine the full extent of co-operative education in Ontario, and it is possible that other Colleges have, or are planning, work-study systems of education.

B. Extensive Use of Co-operative Programs in the United States

Co-operative education was founded in the United States at the University of Cincinnati in 1906. Since then, this educational system has shown a steady growth and 173 different institutions of higher learning in the United States offered some form of co-operative education in 1970, with approximately 70,000 students enrolled in these programs. Co-operative education was offered in 1,964 different fields of study.*

*References may be found at the end of the chapter.

There is considerable variation in the size and administration of the programs at these institutions.

Certain institutions such as Drexel Institute, University of Cincinnati, University of Detroit, Antioch College, and Northeastern University include a large number of their students in the program, and the co-ordinators must find employment opportunities for a wide cross section of students. At other schools, the program is optional; therefore, only part of the student body is participating in the work-study alternative. Frequently, when an optional program is in existence, the institution will exercise some selectivity, and not all students who elect the program will be allowed to participate. In most cases, this selectivity is based on academic performance, and the student must maintain a certain designated academic standing to qualify for, and remain in, the co-operative program.

Another variation is found in other schools wherein all the students are assigned to work at the same time, and an alternating pattern is not utilized. Frequently, this work period is scheduled between semesters in the winter and is considered part of the requirements for a degree.²

C. The Experience of Selected American Institutions

As part of our research, we visited selected universities and colleges operating co-operative education programs in the United States. We summarize below their

philosophies, approaches and some of their experiences. The differing emphasis placed upon the types of work experience sought for undergraduates is of particular interest when reviewing the approach of each institution.

1. Rochester Institute of Technology, Rochester,
New York

The Rochester Institute of Technology (R.I.T.) is a privately endowed co-educational college granting degrees at the bachelor's and master's levels. In 1970-71 there were over 5,300 full-time undergraduates enrolled in the College.

R.I.T. was a pioneer in establishing the co-operative plan of education in 1912. Co-operative education is offered in the following disciplines: Engineering, Physics, Biology, Chemistry, Social Work, and Mathematics.

Students enrolled in the co-operative programs spend their first two years in full-time study. In their third year they spend alternate quarters in full-time study and full-time work in an occupation directly related to the curriculum. Bachelor degree programs in the Colleges of Engineering and Science take five years to complete, while those in the College of Business and Social Work are four year programs.

The College deferred the work elements of the co-operative program to the third year at the time of the economic recession in 1968 when it was difficult to find

jobs for students. The general feeling is that a student should be given two years of education and maturing before being placed in a work situation. In addition, the College encountered difficulties in placing freshmen students.

There are approximately 1,200 students enrolled in co-operative education, with about 340 students attending in summer. This appears to be the full extent of R.I.T.'s summer operations except for a normal summer school for missed courses and upgrading.

2. Northeastern University, Boston, Massachusetts

Northeastern University involves almost all of its full-time undergraduates in co-operative programs, with about 9,500 students enrolled. The freshmen spend the first year in full-time attendance on the campus, and in their sophomore year commence a co-operative study program, alternating quarter terms of study and work for the next four years - a total of five years to earning a baccalaureate degree. Co-operative education is offered to students enrolled in Liberal Arts, Education, Engineering, Business Administration, Nursing and Criminal Justice.

Economics of operation are achieved on a year round basis by attracting large enrolments - with controlled quarterly registrations to balance enrolments by quarter and by restricting the number of optional courses offered to students.

3. University of Cincinnati, Ohio

The University of Cincinnati operates on a quarterly system, each quarter 13 weeks in length with 11 weeks devoted to classes. As part of its curriculum, the University operates co-operative programs involving a total of 1,800 students in the Faculties of Engineering, Business Administration and the College of Design, Arts and Architecture. The calendar pattern followed is similar to Northeastern's, with freshmen attending three consecutive quarters on campus; then split into two sections with alternating study and work terms for the remaining four years. Considerable efforts are made by Co-ordinators to secure the type of employment which provides each student with the opportunity to learn and develop in his chosen career field. Over 1,000 companies employ students in the Cincinnati program. The University has found that for some of the companies, the availability of students to fill a position on a year-round basis is important. For other companies, continuity is not an important criterion.

4. Antioch College, Ohio

Antioch College is a liberal arts college using the work-study method of education. The calendar is made up of four quarters of 11 weeks each.

Roughly half of the students work while the other half are on campus studying. At the end of the quarter, they change places. In order to create two comparable

divisions of students for the alternating schedule, one-half of the freshmen enrol in the summer following their graduation from secondary school. The other half enter in the fall quarter of the year. Unlike the Cincinnati co-operative program, which is career oriented, Antioch's program emphasizes experimental learning over a total period of five years. Significant numbers of students complete their programs in four years and about 20% complete their programs in three years. It should be noted that over the years, various surveys of students' attitudes toward their Antioch experiences have consistently reflected a high regard for the value of work terms.

The curriculum at Antioch is largely unstructured and is noticeable for its lack of pre-requisites, co-requisites and sequential course offerings. Students are given wide latitude in switching from one faculty division to another.

Theoretically, students rotate work and study quarters. However, increasing numbers of students are seeking to extend their work programs from one quarter to two or even to three consecutive work quarters. Students seem to favour the summer quarter for their work-term, resulting in a drop in summer enrolment. Also, members of the faculty prefer the summer term off. Faculty involvement is noticeably lower in the summer than in any

of the other quarters. Students frequently mention the paucity of summer course offerings as the reason they avoid registration in that quarter.

The deficiencies of the present calendar most frequently identified are as follows:

- a) The academic and advisory functions suffer from lack of continuity. Curricular planning is difficult from one year to the next, and even from one quarter to the next.
- b) The admission of new students at two times of the year creates problems. There are two periods of orientation, and half the students must be persuaded to enter at the awkward time immediately following high school graduation.
- c) The pace and complexity of the program suggest the need for some quiescent period for planning, catching up on backlogs of work, taking vacations, and essential plant maintenance.
- d) Academic offerings in the four periods tend to be unequal due to difficulty in scheduling summers off. As a result the summer quarter has been notably weak in curriculum, enrolment in that quarter is low, and this factor has caused some financial difficulties for the College.

5. Kalamazoo College, Michigan

Kalamazoo College is a relatively small private liberal arts college with an enrolment of about 900 students. The College offers a unique four year program which incorporates "Foreign-Study" and "Career-Service" terms. Operating with the quarter calendar system, the College operates year round and closely controls the numbers of students who are on-campus and off-campus at any one time. In contrast to Antioch College, the College places tight control over the frequency of course offerings within a given year, and limits the flexibility of faculty in choosing their terms off. They have achieved a relatively high student/staff ratio of 17:1 and balanced enrolments by quarter. In these ways, the College has achieved economies despite its limited size.

D. Sandwich Schemes in the United Kingdom

Under the Sandwich Schemes in the United Kingdom, students are drawn from industry and the employer sponsors his employees while they attend a college or university. The programs alternate study and work periods, with students attending school for as little as three or four months in each year.

The employer is given special tax incentives by the Government to offset the costs of his employees taking

part in these programs. The programs are very much like the technical training programs offered by General Motors in the United States.

E. Advantages and Disadvantages of Co-operative Education

In 1958, an extensive two-year study was undertaken by James W. Wilson and Edward H. Lyons to determine the educational advantages of co-operative programs. This study was completed in 1960 and the results were published in a book entitled 'Work-Study College Programs: Appraisal and Report of the Study of Co-operative Education'.

The study found the following advantages in co-operative education:

1. Students on co-operative programs find greater meaning in their studies.
2. Co-ordination of work and study increases student motivation and purpose.
3. Co-operative experience helps students become mature and independent.
4. Students develop greater skills in human relations.
5. Students are helped to orientate to the world of work and to test their aptitudes.
6. Some able students are encouraged to pursue higher education who would not otherwise have done so or have been able to do so.

7. Academic institutions benefit from the close liaison with business and industry that is concomitant with a co-operative program.
8. Co-operative programs permit fuller use of university capital facilities.
9. Co-operative industries and other organizations prefer to have training and orientation programs completed before graduation and have a better view of young graduates as prospective employees.³

Some of the other advantages cited in literature on the subject, and in our interviews, include:

1. Many students may become largely self-supporting because of guaranteed employment opportunities during their university life.
2. Studies have indicated that co-operative graduates frequently receive premium salaries upon graduation.
3. Some liberal arts institutions approve of work-study plans because it enables their students to deal with the practical as well as the theoretical. It enables the student to break through the "ivory tower" effect of the sometimes isolated campus and also to engage in "service" types of employment which they regard as important.

Some disadvantages to students claimed of co-operative programs include the following:

1. Studies are broken up by students shifting from work-terms to study-terms and back again.
2. Students tend to forget what they have learned in earlier terms.
3. Students may not participate in extra-curricular activities.
4. Students' employment in work-terms might be curtailed during economic depression.⁴

The studies of Wilson and Lyons indicated that these presumed disadvantages were not occurring and that co-operative students are basically the same as students in conventional programs.

For the university or college involved in co-operative education, there is no doubt that significant efforts have to be put into planning and the co-ordination of students in suitable work situations. Also, there are the additional costs of year round operation, co-ordination and the added fifth year in most undergraduate programs. However, we mentioned earlier that economies can be realized by permitting fuller use of the university plant facilities, provided that enrolments are relatively high and controlled.

F. Expansion of Co-operative Education in Ontario

As mentioned earlier in this report, the University of Waterloo is the only Ontario university with a significant program in co-operative education. The programs mounted by

the Colleges of Applied Arts and Technology are relatively small and experimental.

A study of all the co-operative programs offered in Canada and the United States indicates that over 40% of all co-operative programs are in Engineering. A study dealing with Engineering Education in Ontario, entitled "Ring of Iron" and prepared for the Committee of Presidents of the Universities of Ontario, recommends that Waterloo continue to be the only engineering school offering a co-operative program in Ontario throughout the 1970s and that its engineering be limited to this type of program. Their major reasons for such a recommendation are the scarcity of employment opportunities for students, and the possible future effects of new co-operative programs being introduced in other provinces which may cut into the employment market for Ontario university students.⁵

The above comments suggest that any future moves into the co-operative education field by Ontario universities or colleges would be in other disciplines, which might include: Business Administration, Library Science, Social Sciences, Languages (foreign work assignments), and many vocationally oriented disciplines.

Several factors would have to be considered before the introduction of new and significant co-operative programs by universities or colleges in the province of Ontario, other

than by the University of Waterloo, which has at this time considerable experience and co-ordination facilities. Some of the major factors are as follows:

1. Generally, a co-operative education system means a year round operation either on a trimester or quarter calendar for the faculty sponsoring such a program. The splitting of students into two groups to achieve balanced enrolments and the duplication of a large proportion (if not all) of the courses in any year requires a substantial and controlled enrolment in order to achieve an economic operation. A number of people, experienced in the matter, indicated a minimum freshman enrolment of 300 students and a total undergraduate enrolment in excess of 1,000 for all five years would be necessary.
2. The calendar must be arranged on a semester or quarter term basis and yet integrate with other faculties at the universities operating on the 'traditional year' or two term calendar system.
3. For success, the work terms in a co-operative program must provide a good deal more than simple employment or the chance to observe others at work. Meaningful, well-organized programs of experience offering a challenge and responsibility seem to be essential

and seem to work to the best advantage of industry, even though requiring more effort. Most universities or colleges with co-operative programs have established separate 'Departments of Co-ordination', whose functions are to find suitable work positions and to oversee industrial or governmental employment, and training. The development of a large group of employers willing to accept co-operative students can require several years of effort and definitely places constraints upon the rate of growth of co-operative programs.⁶

4. The operating cost of a co-operative program is the same as for a course of conventional character provided that significant enrolment is achieved. Some economies may result from the distribution of overhead costs over the three terms, instead of two, in the calendar year, but these are offset by the cost of operating a co-ordination department with its salaries and substantial travel expenses. The co-operative system does offer the potential of savings in capital investment.

Footnotes:

- ¹ The Co-operative Education Association. A Directory of Co-operative Education; Its Philosophy and Operation in Participating Colleges in the United States and Canada, Philadelphia: Drexel University, 1970. p. 16.
- ² Co-opportunities at Northeastern University. Boston, Massachusetts: Northeastern University, 1970-71.
- ³ Wright, D.T. The First Five Years of the Co-operative Engineering Program at the University of Waterloo (Montreal, Engineering Institute of Canada). 1962. p. 5.
- ⁴ The Co-operative Education Association. op. cit. p. 16.
- ⁵ Lapp, Philip A. et al. Ring of Iron, A Study of Engineering Education in Ontario, Toronto: A Report to the Committee of Presidents of Universities of Ontario, 1970. p. 73.
- ⁶ Wright, D.T. Some Considerations on Engineering Degree Studies at the Memorial University of Newfoundland, Waterloo: University of Waterloo, February, 1967. p. 24.

COMMISSION ON POST-SECONDARY EDUCATION IN ONTARIO

RESEARCH STUDY NO. 26, "ORGANIZATION OF THE ACADEMIC YEAR"

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LISTING OF UNIVERSITIES, COLLEGES, AND
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Fanshawe College

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University of Florida

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